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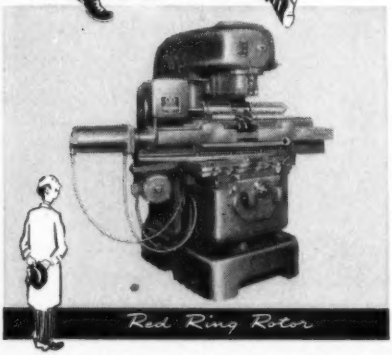
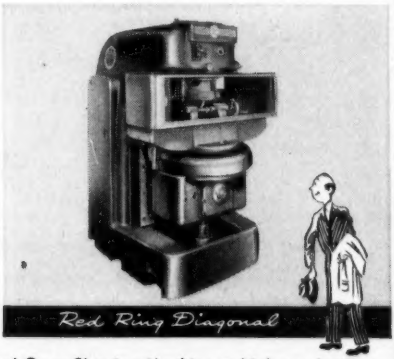
MACHINE TOOL SHOW

If you are interested in modern precision gearing, its production and inspection, you will doubtless be interested in the new Red Ring equipment to be exhibited at the Machine Tool Show in Chicago, September 17 to 26.



Red Ring Rotor



Red Ring Diagonal

Featured in this exhibit will be the new Diagonal Gear Shaving Machine, a high production unit which has materially extended the field of gear shaving.

Another feature will be the new Red Ring Rotor Shaving Machine which has been so successful in reducing the cost of finishing the rotor laminations of electric motors.

Included also will be the standard gear shaving machines, a gear lapping machine, gear checking and sound testing machines.

The latest in broaching practice with naloy broaches, broached parts and cutting tools will be there for your inspection.

National Broach engineers will be at BOOTH 607 to explain this equipment and answer your questions. You are cordially invited to stop by.

2735

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Assistant Editor
SHELBY McMILLION
Business Manager
FREDERIC C. THIEME
Advertising Manager

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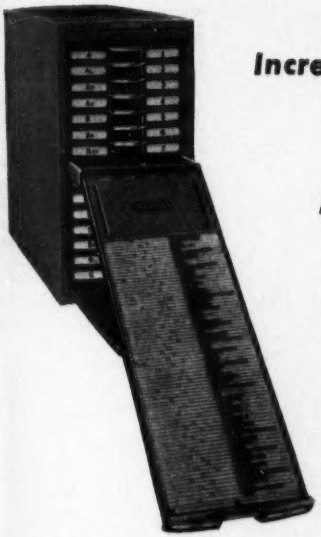

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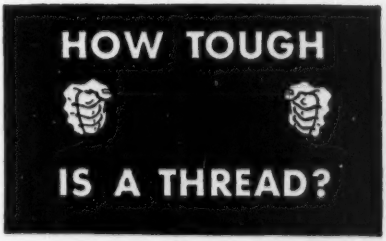

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WELDING ELECTRODES, RODS AND WIRE OFFERED AT 50% OF ORIGINAL COST

Electrodes for use in electric arc welding of ferrous and non-ferrous metals in sizes ranging from 3/32" to 5/8" diameter, in 14 and 18 inch lengths. Also high quality welding rods usable either for acetylene or electric arc welding. Diameters from 3/32" to 5/8", in 36" lengths, all packaged or boxed for domestic shipment. Also a quantity of high quality standard welding wire available, wrapped in coils for easy handling.

TACKLE AND SNATCH BLOCKS

Both wood and steel tackle and snatch blocks in a wide variety of sizes. Some are for use with manila and some for use with wire rope. Most types in single, double or triple sheave.

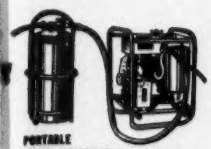
HOW TO BUY:

1. All negotiations to be handled by your representative or exporter resident in the U. S.

2. In general, terms are cash, prices f.o.b. railway cars, location, but responsible exporters may obtain credit. Exporters and U. S. wholesalers purchase at equal prices.

3. Unless otherwise specified by WAA, items are not packed for export, so your agent is responsible for export packing and preparation of export shipping documents.

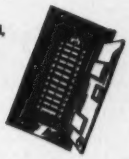
4. All surplus items should be inspected by your agent before purchase. Most surplus property is unused; some is used. All items are subject to prior sale.



PORTABLE WATER PURIFICATION EQUIPMENT

This equipment converts water of questionable purity and clarity into clear, safe drinking water. It is simple to operate—trained personnel not necessary. The machine lifts water from its natural source and forces it through the chlorination and filter units to storage tank. The filter medium can be readily cleaned.

DISTRIBUTION, POWER AND LIGHTING PANEL BOARDS



Wall and panel types, both large and small capacity. In many cases their construction permits alteration without disturbing wiring connections. Some have interlocked doors for added safety. Also Marine Type boards for ships or wherever conservation of space is necessary.

USED GANTRY CRANES

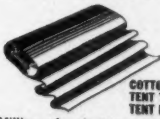
Heavy duty Whirley Gantry Cranes. These cranes are used but in good condition and should render years of valuable service.

Types Available: 15 to 60 long tons pick-up capacity Diesel, electric or steam power. Variable boom lengths. Varying heights, track to boom hinge pin, 40 to 70 feet. Various track gauges up to 21 feet.

HAND CHAIN HOISTS

Many sizes and types of chain hoists for all material handling jobs. They are simple to operate and are economical time and labor saving devices wherever heavy lifts are encountered. All capacities. The following types are offered:

Spur Gear Hoists • Screw Type • Differential Type • Pull Lever Type



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Millions of yards of top-quality fabrics offered at new, low, fixed prices. Available in various weights and widths. Much of this material has been specially treated to resist water, fire and mildew. Can be used in the manufacture of tarpaulins, tents, shoes, work clothing, floor covering, luggage, sporting equipment, artificial leather and dozens of other items. Fabric colors are: grey, dark blue, khaki, and olive drab.

STERILIZERS

These sturdy sterilizers, which were designed for rugged military use, are now available at prices far below manufacturer's cost. They are unused and are in "like new" condition. The many models are heated by various methods including: artificial or natural gas, steam, gasoline burner, alcohol burner or electricity. The electrically-heated types are equipped for 220 Volts—50 Cycle alternating or direct current.

TURNBUCKLES

Turnbuckles in a wide range of sizes, finishes, types and prices are available. Types include: with stubs; without stubs; hook and eye; eye and eye; hook and hook; jaw and eye; jaw and jaw.

THE FOLLOWING ARE INCLUDED AMONG THE THOUSANDS OF ITEMS OFFERED FOR SALE:

General Industrial Equipment

Electric Generator Sets
Junction Outlet Boxes
Connectors, solderless and soldering, and Soldering Lugs
Flexible Materials, Tubing and Conduit
Multiple Operator Welding Machines, 1500 Amp. Type
D. C. Welding Machines, Single Operator, 200 to 600 Amp. capacity
A. C. Welding Machines, Single Operator, 300 to 1000 Amp. capacity
Tubular Steel Electrodes (for underwater metal cutting)
Forging Manipulators
Industrial Scales
Conveyors—Monorail, Trolley, Gravity Roller and Belt Material Types.
Rate-Clone Dust Collectors
Paint Spray Equipment
Centrifugals and Separators
Pneumatic Tools
Vertical-drive Steam Turbines
Industrial Furnaces—including Melting, Heating and Heat Treating Furnaces and Ovens
Resistance Welding Equipment

Materials and Supplies

T. N. T. and Demolition Blocks
Benzol
Sulfur dichloride
Potassium Bifluoride
Isobutyl Methacrylate
Hydraulics and Recoil Oils
Sealing Compound (Waxes)
Cutting Oils, Compounds
Quenching Oils
Petroleum Greases
Jute, Sisal and Manuscan Rope

Metals

Battery Bridge Component Parts
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1171-1

Knitting-Machine Ingenuity

Knitting speed doubled by clever engineering. Twin crankshaft provides cam action. Needles and tensioner changed. Beam speed regulated

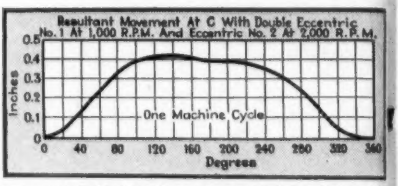
Solution has been found to a long-standing textile industry problem: how to increase speed in warp knitting machines without using unreasonable accelerations, and simultaneously to overcome needle and yarn breakage. FNF, Ltd., England, has produced a 28-gage machine with a theoretical top speed of 1,400 courses per min. (cycles of needle action), and a certain cruising speed of 1,000. Needle mechanism acceleration is 400 ft. per sec. per sec. Before the war the best machine cruised at about 450 courses per min.; if speeded to 1,000, needle mechanism acceleration would have been an unreasonable 5,800 ft. per sec. per sec.

FNF attained the high performance by two-piece needle design, a double-crankshaft eccentric motion to actuate the needles, and a positive self-tensioning yarn let-off mechanism.

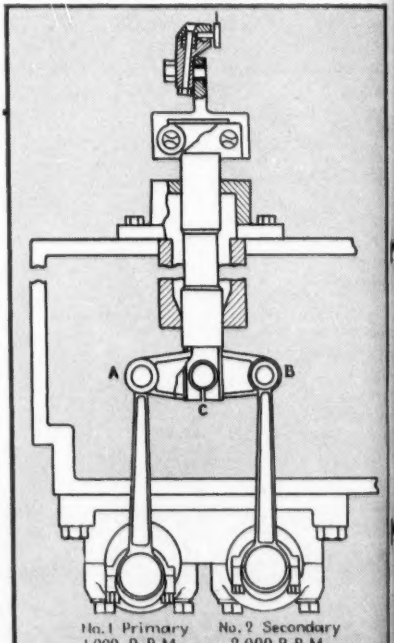
Consisting of a tubular hook closed by a convex tongue, both parts simultaneously and independently driven, the two-piece needle moves 0.42 in. against 0.73 in. for a standard bearded needle. Small movement of needle parts allows timing latitude so that crankshafts can be employed as prime movers.

The double crankshaft arrangement adopted is superior to the usual cams because of greater accuracy of displacement at high speeds and less inaccuracy from wear. Conventional connecting rods, one from each crankshaft, are joined by a crossmember. At 1,000 courses per min., one shaft turns at 1,000 rpm., the other at 2,000. This imparts to the needle bar pushrod a motion cycle with delay at the top position. And the double harmonic motion facilitates balancing so that the machine has the rhythm associated with sewing machines.

For yarn tensioning, FNF uses a steel strip 3 in. wide, 0.014 in. thick. A dull-chrome, radiused aluminum beading is mounted on the strip so that threads



Two crankshafts (below), one turning twice as fast as the other, drive needle bar assembly of high-speed FNF warp knitting machine. Curve of bar motion is shown above.



passing over it cause the steel member to act as a cantilever. Thus, mass is minimized, yet tension control is adequate for high speeds. Mass of conventional bar and frequencies of springs made it unsatisfactory at speeds over 700 courses per min.

To deliver yarn, at a precise rate regardless of beam diameter, a special beam speed control is used. Control is actuated by a slave thread from a yarn package. This thread then is led twice around the beam and into knitting center where it joins other threads. Also on control shaft is a fixed disk carrying two electrically energized segments. One is a beam-retard, the other a beam-advance. Yarn driven disk has an electrical contact, spring-loaded against face of fixed disk. When disks are revolving at preset speed, the contact is on a dead spot. When yarn disk slows because of gradual reduction in beam diameter, or operator advances machine speed, disks go out of synchronization, and electrical contact is made through beam-advance or -retard segments. A control circuit then shifts the position of a rubber friction ring between the two cones of a variable-speed drive geared to beam.—PRODUCT ENGRG.

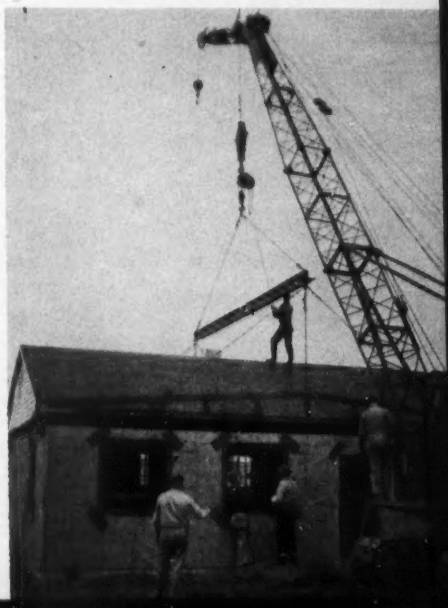
Quick Steel-Frame Houses

Complete walls and roof are prefabricated on assembly lines at site and lifted in place by crane. Ten houses built in one day. Price kept low

Production-line prefabrication of house components on construction site enables the Byrne Organization economically to erect up to ten one-family dwellings a day in 1,000 man-hours each. In an $8,000,000 development near Baltimore, 1,200 of the steel-frame, 26x38-ft. basementless, one-story houses will be built on landscaped 60 x 100-ft. plots, and will sell for less than $7,000.

Foundations are 12 x 12-in. concrete grade beam and 4-in. floor slab with radiant heating coils embedded. Walls are 1-in. stucco exterior and ¾-in. plaster interior on 3⅝-in. studs welded of Macomber nailers (16-gage steel round section with split flanged face). Roofs are steel trusses sheeted with ½-in. plywood, 15-lb. asphalt felt, and 210-lb. asbestos shingles. Glass fiber insulation is used.

Housed in Stran-Steel Quonset buildings totaling 1,120 ft. in length, prefabrication and assembly shops at project are coordinated to turn out one set of house components an hour. In the wall assembly shop, Macomber steel strips are cut to length and welded into subpanels on steel jig tables. These panels, complete with door and window framing, are assembled in full wall length in a larger



After prefabricated walls of steel-frame houses are set in place by crane, roof is lifted on top of them. Temporary lifting trusses at eave edges support complete roof.

Knitting-Machine Ingenuity

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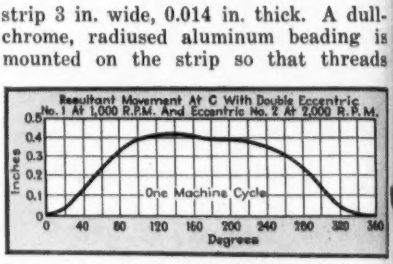
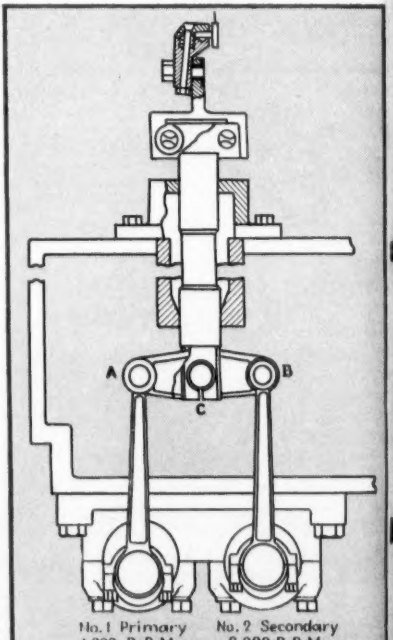


Two crankshafts (below), one turning twice as fast as the other, drive needle bar assembly of high-speed FNF warp knitting machine. Curve of bar motion is shown above.



passing over it cause the steel member to act as a cantilever. Thus, mass is minimized, yet tension control is adequate for high speeds. Mass of conventional bar and frequencies of springs made it unsatisfactory at speeds over 700 courses per min.

To deliver yarn, at a precise rate regardless of beam diameter, a special beam speed control is used. Control is actuated by a slave thread from a yarn package. This thread then is led twice around the beam and into knitting center where it joins other threads. Also on control shaft is a fixed disk carrying two electrically energized segments. One is a beam-retard, the other a beam-advance. Yarn driven disk has an electrical contact, spring-loaded against face of fixed disk. When disks are revolving at preset speed, the contact is on a dead spot. When yarn disk slows because of gradual reduction in beam diameter, or operator advances machine speed, disks go out of synchronization, and electrical contact is made through beam-advance or -retard segments. A control circuit then shifts the position of a rubber friction ring between the two cones of a variable-speed drive geared to beam.—PRODUCT ENGRG.

Quick Steel-Frame Houses

Complete walls and roof are prefabricated on assembly lines at site and lifted in place by crane. Ten houses built in one day. Price kept low

Production-line prefabrication of house components on construction site enables the Byrne Organization economically to erect up to ten one-family dwellings a day in 1,000 man-hours each. In an $8,000,000 development near Baltimore, 1,200 of the steel-frame, 26x38-ft. basementless, one-story houses will be built on landscaped 60 x 100-ft. plots, and will sell for less than $7,000.

Foundations are 12 x 12-in. concrete grade beam and 4-in. floor slab with radiant heating coils embedded. Walls are 1-in. stucco exterior and ¾-in. plaster interior on 3⅝-in. studs welded of Macomber nailers (16-gage steel round section with split flanged face). Roofs are steel trusses sheeted with ½-in. plywood, 15-lb. asphalt felt, and 210-lb. asbestos shingles. Glass fiber insulation is used.

Housed in Stran-Steel Quonset buildings totaling 1,120 ft. in length, prefabrication and assembly shops at project are coordinated to turn out one set of house components an hour. In the wall assembly shop, Macomber steel strips are cut to length and welded into subpanels on steel jig tables. These panels, complete with door and window framing, are assembled in full wall length in a larger

After prefabricated walls of steel-frame houses are set in place by crane, roof is lifted on top of them. Temporary lifting trusses at eave edges support complete roof.

stalled beneath a metal chassis having cutouts through which tubes and i-f transformers may be inserted from above. Gang-tuning capacitor, loudspeaker, and controls are mounted on metal chassis by conventional methods.

Performance tests indicate that little or no circuit modification is required for stamped wiring. There is reason to believe that the careful planning and placement of parts may permit tube operation near the spill-over or hot point, with better performance. Alignment of circuits in production should be materially simpler, since die cut wiring will not vary from set to set. Cost savings should be substantial; Franklin believes stamped wiring decks for 5-tube model radio, with tube sockets in and ready for component parts, will cost only about twice present cost of sockets. —ELECTRONICS

REDUCING GROUND UNITS FOR AIRPORT SERVICE

By incorporating several ground-service units into transport aircraft, 16-40 man-hours per day can be saved at each airport stop. Capital Airline engineers estimate yearly savings to airlines would range between $225,000 and $600,000 if the current average of 51 pieces of equipment per gate were reduced to 25 or less. Recessing service units into the ground or consolidation of several units into one also would reduce ramp congestion. Fuel, the biggest bottleneck, should go underground for speed and safety.

Pump truck for fuel should include oiling equipment and working platform. A utility truck, primarily a fresh-water carrier, should also include spare high-pressure oxygen bottles, spare hydraulic fluid containers, and an auxiliary power plant. It could, at the same time, tow cargo train to plane or plane to parking area if tow bar were included. Built-in steps are already in use, light in weight and fitted for pressurized cabins.

Current ground equipment that could easily be incorporated in plane includes: surface control locks, auxiliary power source, nose cargoveyor and loading steps, passenger steps, tail pedestal, double safety landing gear locks, underwing refueling facilities, and air conditioning units to operate when the power plants are inoperative. —AIR TRANSPORT

STRONG-WHEN-WET PAPER SOLVES PACKAGE PROBLEMS

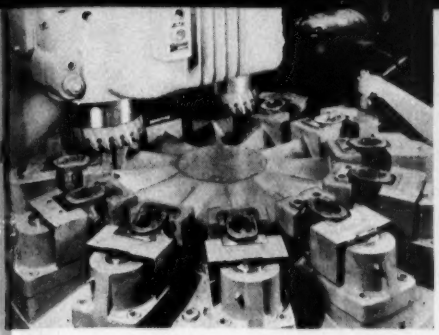
Used in combat maps during the war, paper which retains its strength when wet is proving valuable in food packaging. Secret of paper's unusual toughness is the addition of a colloidal solution of melamine formaldehyde resin to the pulp in the proportion of 0.5 to 3.0%. Fibers are bonded together and resist separation when exposed to liquids.

Two- and three-ply sacks are used to ship cleaned and sorted potatoes in 10-, 15-, and 50-lb. retail quantities for sale without rehandling. The bags absorb moisture from bruised potatoes without breaking. Paper also is used to line crates of fresh vegetables which are exposed to moisture from ice in refrigerator cars. Other applications: wrappers for moist meat, fish, butter, and ice cream; labels for beverage bottles; bags for moist foods. —FOOD INDUSTRIES

CLEANS MINE CARS QUICKLY

A 20-car train of Granby-type side-dump cars can be cleaned of frozen muck in 10 min. with a retractable scraper cleaner designed and built in the shops of Climax Molybdenum Co. Blade, fitted with scraper teeth, is pushed by pivoted, double-acting air cylinder. Blade is supported on a rectangular frame. Roller guides above and below push arms keep frame aligned. A pair of steel guides and rollers at far end of frame control initial stroke of scraper so blade misses open car door.

Operator controls scraper through a three-way valve in cab near car dump. Cleaning may be done while the cars are unloading. —ENGRG. & MINING JOURNAL

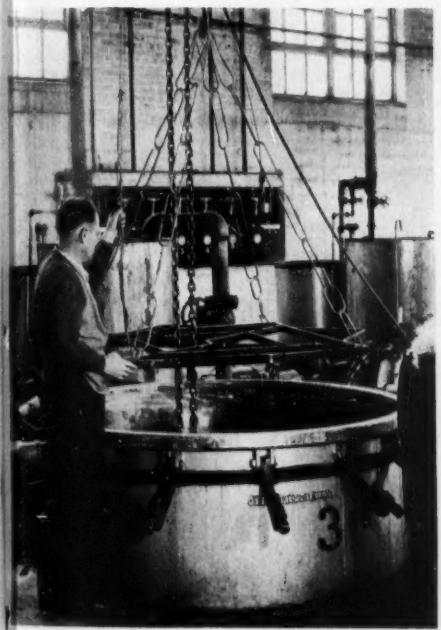


BUICK EFFICIENCY—Emphasis is placed on machine tool fixtures which can be loaded and unloaded easily and quickly in Buick's continuous program of plant modernization. As an example, a cam built into machine tool base controls clamping and unclamping of fixtures holding oil-pump body. —AMERICAN MACHINIST

ECONOMICAL ANNEALING—Two 5-kw. electronic heaters anneal milk can necks at Buhl Mfg. Co. in 12 sec. One operates while other is loaded. Heaters fit into production line to save transfer. One man anneals more than two with gas-fired furnace which heated breast of can and required pickling to remove scale. —ELECTRONICS

Quick Work

UNLOADS CARS QUICKLY—Flatcars unloaded by bulldozer took place of dump cars on grading job by Hamer Bros. Cars had wooden sideboards at one edge, hinged apron at other. Steel-plate decks and sideboards bridged gaps between cars. —CONSTRUCTION METHODS



LOADING CROSS FOR DYE VAT—Loading cross for dye vat is in use at the Atlanta Woolen Mills. Lowered to perforated false bottom of vat, cross facilitates moving of batch from vat to squeezer. It is of stainless steel, suspended at corners by chains from hoist. Vat capacity is 600 to 750 lb. —TEXTILE WORLD

Orange Juice Engineering

High-quality frozen and dehydrated juice produced by newly engineered methods in plant with daily capacity of 450 tons of fruit. High vacuum used

In canning orange juice, one line of development has led to short-time, high-temperature pasteurization of deaerated, deoiled juice. The juice is packaged in hermetically sealed containers without further processing and stored at temperatures below 70°F. This is the canned orange juice of today, consumed in huge volume.

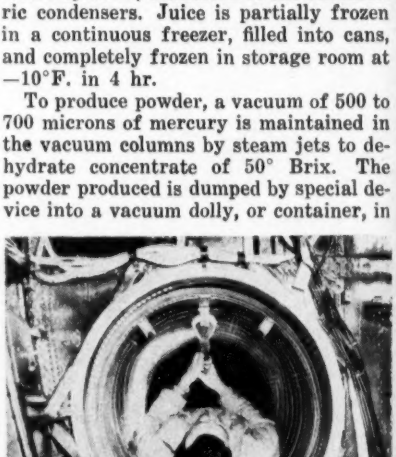
A second line of development has led to the concentration of the juice in a vacuum evaporator, packaging in cans and freezing, for sale in frozen state. This product is not sterilized by heat, as flavor would be impaired. Several firms have been marketing the frozen juice with considerable success. A particularly high vacuum and low temperature are used by Vacuum Foods Corp.

A third line of development has led to the dehydration of concentrated juice to a hygroscopic orange colored powder containing less than 1.5% of water. If this powder is packaged immediately in hermetically sealed containers, free of air, and stored below 80° F., it has a very considerable merchantable life and will reconstitute into a product that is excellent, although not the exact equivalent of freshly squeezed juice. The first to produce a successful commercial orange powder, Vacuum Foods soon will be engaged in large-scale production of the product.

Before extracting the juice, all waxy material which may imprison bacteria is removed from the outside of the peel, as well as dust and sprayed chemicals. First comes a wash in warm trisodium phosphate water solution, followed by a soap suds application and thorough scrubbing with rotary brushes. Soap is removed by chlorinated water rinse, then the fruit is held 4 min. in a germicide tank. A second scrubbing under sprays of chlorinated water removes the germicide.

After the juice is extracted, it is run through a rotary sieve finisher. That to be frozen is sprayed onto the heated interior walls of 28 ft. x 30-in. dia. hot-water-jacketed vacuum columns. Passing through 13 units in series, the juice is concentrated to about 50° Brix, or about 5-fold. Fresh juice added to restore lost flavor brings it to 42° Brix. A vacuum of 12-15 mm. of mercury is maintained by booster ejectors exhausting into barometric condensers. Low residual air pressure is maintained by small 2-stage steam ejectors, connected to the barometric condensers. Juice is partially frozen in a continuous freezer, filled into cans, and completely frozen in storage room at −10°F. in 4 hr.

To produce powder, a vacuum of 500 to 700 microns of mercury is maintained in the vacuum columns by steam jets to dehydrate concentrate of 50° Brix. The powder produced is dumped by special device into a vacuum dolly, or container, in



SUPERBOMBER SUBWAY—To speed movement of crewmen through 85-ft. tunnel linking forward and rear pressurized compartments of enormous XB-36 bomber, Convair engineers devised a "railway" system. Lying face up on four-wheel scooter, crewman propels himself hand-over-hand along cable. —AVIATION

which it is taken to the packaging room where relative humidity is kept at 20% by a silica gel dehumidifier.

The $2,500,000 plant operates 24 hr. a day, except for 4-hr. shutdown every 36 hr. for complete cleanup to avoid bacteria buildup. Capacity is 450 tons of oranges, or 48,000 gal. of juice a day. —FOOD INDUSTRIES

REFACING DAM SURFACE

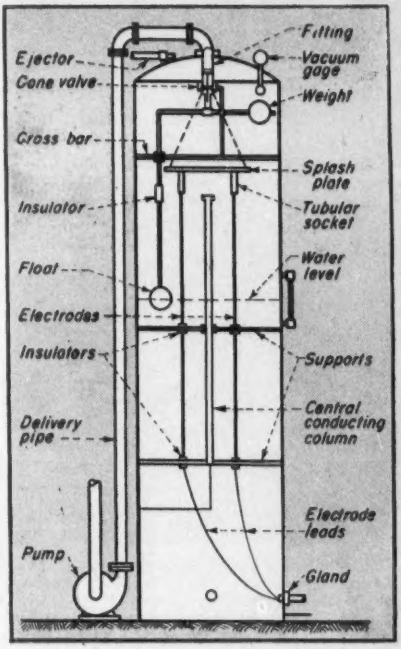
Precast reinforced concrete slabs, fastened in place to act as forms for concrete to be placed by Prepakt process, were used to resurface the upstream face of Baker Dam. Slab facing is built up as an outer form from which projecting steel rods are welded to rods in dam face. Dowels in dam are grouted in place. As wall rises, space between slabs and dam face is backfilled with coarse aggregate, then grouted.

Placement of slabs was carried out during winter and was completed for spring run-off. —ENGRG. NEWS-RECORD

ELECTRICAL DEAERATOR DEVELOPED IN ENGLAND

Electrical deaeration of feed water has eliminated the cause of severe corrosion in the high-pressure boiler feed lines and economizers at Slough Estates, Ltd., power plant in England. In the new process, developed by the plant's engineering staff, water from the feed tank is pumped into the top of the deaerator and falls in a conical sheet towards a plash plate. This plate breaks it up so that it falls as a spray against the sides of the vessel. An ejector maintains a vacuum in the upper part of the tank. This removes the liberated gas and delivers it, together with the steam, to the feed tank.

Four vertical electrodes are used in a 60,000 lb. per hr. deaerator, these being spaced around a central conducting column and extending up into sockets in the splash plate and into the vacuum space above the water level. A 12-volt



Electric deaerator developed in England applies a voltage to water to destroy its affinity for oxygen.

potential is maintained between electrodes and shell by a rectifier, and about 0.8 amp. flows. Energy required for electrical deaeration is negligible.

The electrodes charge the water to a potential less than that for electrolysis and destroy the water's affinity for oxygen. In nearly 2 yr. of operation, the deaerator consistently has given absolute zero dissolved-oxygen content by Winkler's test and 0.001 to 0.007 ml. per liter by orthotolidine test.

Cone valve operated by a float controls inlet of water. Splash plates consist of 3-ft. dia. mild steel plates, 3/16 in. thick. Electrodes are 2-in. pipe. Plates erode and corrode and last about 1 yr. Some corrosion of electrodes also occurs. —POWER

LOW-COST WIRE RECORDER—Priced for the mass market at $169.50, a new radio and magnetic wire-recorder phonograph combination has been introduced by Sears, Roebuck & Co. A turntable and tone arm also are included so that records may be played directly or recorded on the wire for magnetic reproduction as part of a 1-hr. program which can be put onto one 3½-in. spool of stainless steel wire. —ELECTRONICS

NEW POWER TRENDS, IDEAS REVEALED AT CONFERENCE

Speakers at Midwest Power Conference revealed the following new trends and ideas: New steam-electric power stations require one-third less operating force than older stations of same capacity . . . Semi-outdoor installations are increasingly popular in all parts of the United States . . . In 1946, power plant construction costs averaged 50% above prewar prices . . . Incomplete studies indicate that the use of certain low-cost metals in the combustion chambers of internal combustion engines may improve operations radically . . . Under certain conditions, a regenerative-cycle gas turbine is more economical than a high-pressure, high-temperature steam plant. A simple-cycle gas turbine may prove economical as a peak-load plant only when applied to a system with a high-efficiency performance; as a booster and peak-load unit at end of transmission line, it can be quite profitable . . . For house heating, reversed-cycle refrigeration (heat pump) drawing heat from coils in ground can compete with coal, oil, or gas heat on cost basis only when electricity is 0.85 to 1.5¢ per kwh . . . Hot air passing in a closed circuit through ceiling panels of ordinary lath and plaster has been recommended for heating rooms. —POWER

ZERO LANDINGS HERE

New landing system developed by Westinghouse Electric Co. will penetrate fog or snow up to 1,000 ft. altitude. The system includes four component parts: approach lights, red and green "busy" lights, powerful runway lights, and approach-angle indicator. Approach lights extend two-thirds of a mile from start of the runway and are of two types. In one, a 4-in. quartz tube of krypton produces 3,300,000,000 candlepower flashes. The other contains six neon lamps, burning steadily and producing 10,000,000 cp. Runway lights are 100,000-cp. units, reflecting light up and down runway. Red and green flashing lights will indicate a full or clear runway. System is to be installed at New York's Idlewild Airport. —BUSINESS WEEK

SILVER JOINS CAST IRON

Design possibilities are offered by use of silver brazing to join cast iron to cast iron or to aluminum, brass, or similar metals. Casting is cleaned by electrolytic action in bath of molten caustic salts. Minute porosities that result will accept silver soldering with such a firm bond that joint is stronger than the metal. Complex castings can be made in simple sections and put together by this process of Kolene Corp.—PRODUCT ENGRG.

Work Simplification Pays

Radio Corp. of America conducts training schools for employees to augment services of departments. New techniques are applicable to various industries

Work simplification is becoming an increasingly important phase of plant operation. Radio Corp. of America conducts regular training schools for employees to augment the services of the work-simplification and methods departments. Some of RCA's recent simplifications are reported here, many applicable to other manufacturing operations.

Portable sheet metal, cut to exact size of workbench top and perforated with ¼-in. holes on 1-in. centers, serves as a base to which jigs and fixtures are bolted. Layout of fixtures can be varied quickly and easily to suit any operation.

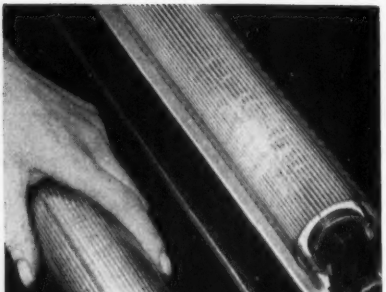
A small magnet imbedded in a rubber finger-cap enables worker to pick up several tiny metal parts at once simply by placing his finger in the parts bin. Parts are pulled up in a jumbled condition but can be separated easily by tweezers in the other hand.

The extreme fragility of electron-tube grids and their tendency to become entangled with one another necessitated design of a special fixture. A trough-shaped grid dispenser, constructed of sheet metal and mounted at an angle to workbench, with two pieces of spring wire at lower end, solved the problem of picking each grid up separately. Springs hold grids up on tray, conteracting their tendency to slide down the incline. Dispensers are held in clips for easy reloading. Fixture is mounted on perforated metal workbench top.

To illuminate properly the welding of filaments to leads in the tube base, a small, pocket flashlight is mounted by clamps to workbench. Light beam is focused on the stationary resistance-welding electrode tip. Low-voltage line supplies power, eliminating battery.

Tracing of testing equipment borrowed from the instrument locker is facilitated by use of numbered metal tags. When instrument is removed from shelf, tag is hung on an adjacent hook. Number on key identifies person holding instrument. To speed the location of recipient of materials received at receiving department, order forms now include name of person to whom package is to be delivered. Formerly, only the name of the clerk in the ordering department appeared.—FACTORY

Methods department representative discusses perforated workbench top for jigs and fixtures with shop foreman and mechanic.



SLIP-ON DIFFUSER—Tenite plastic tubing in seven "transparent" colors for diffusing fluorescent lighting has been introduced by Extruded Plastics, Inc. Inner wall of tube, which slips over lamp, has longitudinal diffusing prisms and spacer splines. —ELECTRICAL WORLD

ELECTRIC-ARC MACHINING DEVELOPED IN RUSSIA

Russian scientists claim to have developed a new method of machining metal by electric erosion. (Basically, principle is same as that of familiar disintegrator used to remove broken taps and to drill hard metals—Ed.) The Soviet machine consists of a toolholder-armature vibrating "hundreds of times a second" in a vertical solenoid, stroke being about 0.5 mm. Copper-graphite rods in toolholder vibrate over workpiece set in basin of oil, eroded metal being thrown into oil bath by the spark discharge. For drilling, engraving, and slotting, the tool is a rod. Surfacing tool is tipped with a 1-mm. revolving disk, a jet of water washing away eroded metal.

Soviet claim is that process requires far less power than motored tools, is revolutionary. —AMERICAN MACHINIST

TROPICAL BUTTER

Developed in the Antipodes during the war, the process for making dehydrated butter has been modified in several ways. The present product melts at 105°F., keeps for long periods without refrigeration. It consists of dry butterfat containing 3% hydrogenated peanut oil, 4% skim milk powder, and 2% finely ground salt, which has been treated with sodium carbonate. Diacetyl (0.2 ppm.) is added as flavoring. At room temperatures, it is about as spreadable as butter. If produced with 102°F. melting point, the flavor is somewhat improved and the slight greasiness on the palate avoided.

Processing is carried out principally in stainless steel equipment. Serum is adjusted to about pH 10 in neutralizing vats by addition of sodium hydroxide or sodium carbonate. Centrifuges then separate fat, which is sprayed into a dehydrator with 29-in. vacuum and 160°F. max. temperature, moisture content being reduced below 0.2%. Dried fat is pumped into clarifier for removal of traces of curd and salt. In a second dehydrator, at higher temperature, moisture is reduced to 0.05% and the fat partially deaerated. Cooling follows, then materials are added in vacuum mixing vats. Deaeration is accomplished under 29-in. vacuum. Product is cooled rapidly from 140°F. to 78°F. and packaged in hermetically sealed vacuum containers. —FOOD INDUSTRIES

SHAPE OF AIRWAYS TO COME

Facilities needed safely to handle heavier air traffic on precise schedule in all weather have been charted by Air Transport Association. Principal features: multiple runways; automatic time blocks, with radar plane-position indication to pilots and ground controllers; cockpit instrument information integrated on a single indicator, giving position of plane, direction and distance from range station, altitude, and track to destination. Block signal will flash red when space ahead is occupied, green when clear. —AVIATION

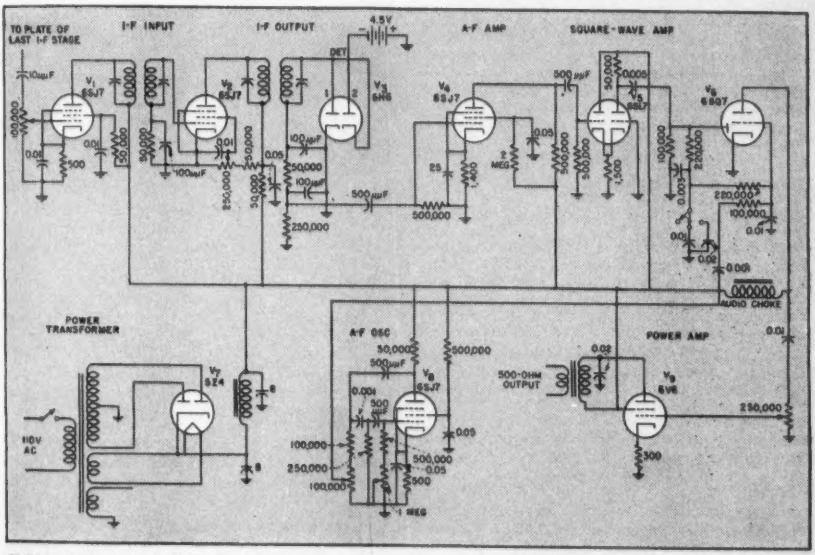
WHY AMMONIUM NITRATE CAN BE DANGEROUS

Explosion of ammonium nitrate at Texas City recently caused one of the worst disasters in the history of American chemical industries. Previous serious explosions of the material—at one time considered inert—occurred in 1918, 1921, and 1924. A less serious explosion took place in an evaporator plant during World War II, even though the Ordnance Dept. was alert to the dangers connected with the substance.

Chemically pure ammonium nitrate may be heated to decomposition point (above 400°F.) and decomposed without either deflagration or explosion. But the admixture of very small amounts of carbonaceous materials renders the mixture sensitive at high temperatures in its molten state. Also, in the evaporator explosion, there is a suspicion that a slight amount of zinc from the galvanized pipe may have been present, and this type of material is known to act as a catalyst.

Cause of the evaporator explosion was the deflagration of an oil-air mixture in an agitator pipe which in turn set off the previously oil-contaminated molten nitrate. This, in turn, exploded the main 4,800-lb. charge in the pan.

As a result of this evaporator explosion, air compressors requiring the introduction of oil into the air stream no longer are used in ammonium nitrate manufacture. —CHEMICAL ENGRG.



CLEAR CODE RECEPTION—By discrimination between time constants of signal and noise in the reception of radio code communications, a system developed by Electronic Labs of Canada provides noise-free reception. Continuous code waves trigger an audio tone generator feeding the loud-speaker. Above is complete schematic circuit of unit primarily for aural reception, and adaptable for connection to i-f amplifier of standard communications receiver. Tubes V_1 and V_2 are sharp-cutoff-type r-f amplifiers, the latter functioning somewhat as a peak limiter. Diodes V_3 in detector circuit have one section acting as the demodulating diode, which prevents modulation of carrier wave on any voltage exceeding the difference between detector voltage and the 4½-volt bias system. —ELECTRONICS

TECHNICAL SHORTS

Solves Casting Problem—In sand casting hollow magnesium-alloy lawnmower rollers with pencil-size core print at each end, Star Mower Co. uses unbonded cores. These disintegrate, can be shaken out through small end holes. —AMERICAN MACHINIST

Vacuum Frees Fingers—Meat plant workers who remove artificial casings from frankfurters are slowed because greasy casing sticks to fingers. This has been overcome and work speeded by a vacuum system that pulls casings from hands and discharges them into bin near incinerator. Suction through 1x6-in. openings in workbenches is generated by centrifugal blower. —FOOD INDUSTRIES

Controls Mine Sprinkler—Replacing the threaded stem of a gate valve with a plain stem and removing the threaded portion of the yoke provides Rail & River Coal Co. with an automatic sprinkler system control for spraying outbound trips. Stem extension rod 20 ft. long connects with lever stand. Lever loop extends out and is deflected by passing trips. Inbye trips do not activate system; timing is so controlled as not to wet locomotive. —COAL AGE

Slide Stops Train—Reinforced concrete block, with concave runners which slide on railroad tracks, is being used experimentally by Great Western Railway, England, to prevent damage to cars being shunted onto storage tracks. Block is 10x6x6 ft., filled to 20 tons by ballast. It is placed about one rail length from end of track; when jarred to end of track it is pulled back by chain imbedded in face. —ENGRG. NEWS-RECORD

Germicidal Lamp for Chickens—Cold epidemics among young chickens have been prevented by germicidal lamps in the brooder houses of a Louisiana farm. Three 15-watt units were installed in each 20 ft. long, 20 ft. wide, 7-12 ft. high, well-ventilated house. The radiation kills airborne germs which cause a cold, but the lamps do not cure the disease. —ELECTRICAL WORLD

Tests to 100-G Acceleration—Electronic and mechanical equipment is subject to 100-G acceleration in airgun developed by Boeing Aircraft Corp. Air pressure is built up in a lower cylinder, then released, firing a cartridge into a cylinder. Air cushion slows down cartridge. Weighing 250 lb., cartridge reaches 50 mph. in 9-in. —BUSINESS WEEK

Vacuum Holds Work—Vacuum cleaner maker uses vacuum to hold plastic sheet on milling machine table. —AMERICAN MACHINIST

PAINLESS VACCINATION — No needle is used with new Micro-Jet syringe. At lower end is .22-caliber sealed cartridge containing serum. At top end is spring which ejects serum thorugh a tiny opening into the pores of the skin. It is now undergoing clinical evaluation. It is a Gelatin Products Corp. development. —BUSINESS WEEK

Metal Spray Saves $309.64—Metal spraying has been used by Hiram Walker & Sons to build up worn and leaky 6- and 8-in. malt and meal plug cocks in 13,000-gal. cookers. Saving was $309.64 each compared with cost of new valve. —POWER

Boeing Folds Plane Tail—Because excessive height of Boeing *Stratocruiser* and B-50 tails prohibit entrance into hangars, vertical stabilizer is now hinged so that it can be folded by screw jack. —AVIATION NEWS

Efficient Light for Textile Plant—Illumination intensity of 75 footcandles over the needle bars of automatic spinning machines in Adams-Millis Corp. textile plant is provided by planned lighting. Fluorescent reflectors, each with two 40-watt lamps, were installed end-to-end on continuous wireway to form a row of light over needle bars 7½ ft. above floor. —ELECTRICAL CONST. & MAINT.

Assembles Cars Upside Down—Rootes, Ltd., Australian car manufacturer, turns cars over on assembly lines to install engine and other parts because of improved lighting and accessibility. —BUSINESS WEEK

Tool Room Incentive Pays—As result of incentive pay system work is done quicker, more economically in tool room of S. S. White Dental Mfg. Co., yet workers earn 35% more. Standards are based upon accurate data determined over a 1-yr. period. Requisite of success is capable toolmaker trained to apply standard times on operations he lays out. —AMERICAN MACHINIST

Oxygen for Locomotives—Oxygen is fed into fireboxes of Denver & Rio Grande Western R.R. locomotives on mountainous runs to aid combustion, increase efficiency. Black smoke is almost eliminated. —BUSINESS WEEK

Improves Microwave Tubes—In microwave electronic tubes, power-output efficiency can be made nearly equal to theoretical maximum by controlling transit angle to suppress secondary emission. If transit angle (ratio of transit time to time of one cycle of oscillation) between an accelerating electrode and an anode exceeds a more or less critical value, secondary electrons emitted from anode experience an ultrahigh-frequency field of such phase and magnitude that they are driven back to the anode and supressed. New phenomenon is useful where inductive output is employed and appears to be only effective solution to suppression in transverse control tubes. —ELECTRONICS

Truck Feeds Furnace—Furnaces are loaded and unloaded by 4,000 lb. electric fork lift truck at Edward Valves, Inc. Although forks are inserted directly into furnace to handle all sorts of forgings, they have not been distorted. Use of truck avoids exposure of two men to furnace heat. Same unit handles die-setting on forging hammers and other heavy work. —AMERICAN MACHINIST

Atom Power From Shale Oil—Uranium oxide, used in generating atomic energy, is a by-product of shale oil production in Sweden. The shale contains about 220 g., or nearly ½ lb., of the oxide per ton. Other by-products obtained are aluminum, vanadium, and molybdenum. —CHEMICAL ENGRG.

Self-dumping Skip—In use at the Cia. Minera Unificada del Cerro de Potosi, Bolivia, mine, a self-dumping skip eliminates need for a full-time operator. As skip is raised, a lug engages a latch and skip door opens as skip is lowered. Face of skip is canted back slightly, so lug releases automatically from latch. Door closes of its own weight, and skip returns. —ENGRG. & MINING JOURNAL

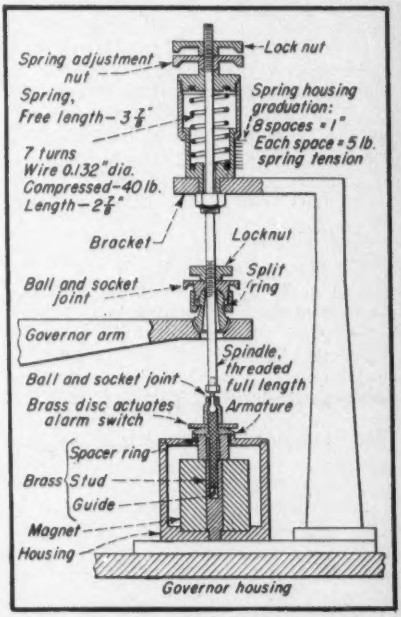
Static for Radio Testing—Atmospheric static is imitated in Harvard's Psycho-Acoustic Lab. to test performance of radio receivers. A fluctuating audio signal from a gas tube is peaked, amplified, and applied to a spark coil which discharges at irregular intervals. R-f signal is used to simulate click, thunderstorm, hiss, or grinder static. —ELECTRONICS

Plywood Ship Decks—Plastic wood laminate will replace Burmese teak as decking on U. S. Navy ships in the future. An 18-month test aboard the *U. S. Bennington* showed that laminate was equal to teak in strength and hardness and in wear and splinter resistance. It is lighter than the fir used for carrier decking and it requires less bolting and calking than wood decks.—BUSINESS WEEK

Floats Tank 2,000 Miles—Too great a load for barge or rail shipment, a steel tank 71 ft. long, 23 ft. inside dia., and weighing 160 tons was floated 2,000 miles on waterways by M. W. Kellogg. —CHEMICAL ENGRG.

Analyzes Creep—Determination of dimensional change in metals at high temperatures can be accomplished to within 1% of load by the new Baldwin Locomotive Works' creep tester. Capacity of the lever-type machine is 12,000 lb. Built-in heating device raises specimen to 1,600°F. through three banks of wire wrapped coils, each rheostatically controlled. Furnaces with 2,200°F. temperatures are available. Strain is read from revolving counter on extensometer; maximum elongation, 1¾ in. —BUSINESS WEEK

Saves 112½ Man-days—To set building steel on reinforced concrete second floor of a plant being constructed in Chicago would have required 120 man-days by conventional methods. The work was done in 7½ man-days, however, by a small 2-ton all-hydraulic crane lifted to the second floor by a ½-cu. yd. truck crane. —CHEMICAL ENGRG.



EMERGENCY GOVERNOR RELEASE—By means of a magnetic release, the governor of a steam-electric generating unit is limited to a maximum normal load yet freed in case of abnormal frequency drop. Pull of the governor arm beyond a set value breaks free the armature of a permanent magnet and allows the governor to take control of the turbine. An adjustable compensating spring opposes pull of magnet. —ELECTRICAL WORLD

Carbon Soldering Cuts Costs

Modernized by work-holding fixtures with built-in electrodes, method is faster, saves labor, reduces rejects, curtails dermatitis

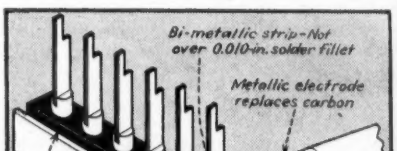
Carbon soldering has been revived and made highly efficient by use of fixtures to speed instrument manufacture. Kollsman Instrument Div. of Square D Co. finds that it reduces rejects, costs, labor, and incidence of dermatitis on workers' hands.

Carbon electrodes are built into the production fixtures, current passing through work. For soldering a rotor and pin assembly, carbon shapes supported by Transite posts hold pre-fluxed work under spring tension and permit rotation for convenient application of solder. Bath in base of fixture gives quick quench to retain joint strength. Using 900 watts supplied by transformer, at 4½ volts, the soldering operation is completed in 17 sec. compared with 3 min. for torch.

Another fixture attaches a center piece to the top and a mounting piece to the bottom of 2-, 3-, and 4-cell diaphragms. The centerpiece has joined to it a wire spring that must not be heated during soldering. This fixture has carbon electrodes inside spring-loaded, air-operated locators which align parts. Preformed solder washers, dipped in flux, are used, and soldering is completed in 7 sec. Resistors in circuit regulate heat for each part.

Bimetallic strips are soldered in slotted end pieces by setting several end pieces in holes in a carbon-block electrode and touching each with a metal electrode. Maximum heat, in shortest time, at end piece results in the most desirable capillary action, preventing solder from rising above fastening point and forming fillet more than 0.01 in. high.

For hand soldering operations, a carbon soldering iron was supplied by Casol Co. It has a ⅜ in. tip with cooling fins. A double electrode model weighing less than 1 lb. localizes not only the heat, but the current. It permits soldering joints in electrical circuits containing components, such as resistors, which may not be capable of carrying the necessary soldering current. A spring-loaded metallic shoe at end of the ⅞-in. carbon electrode touches the same part as the carbon to complete circuit. This is especially desirable for fine wire work.



To solder bimetallic strips in slotted end pieces, the assembled units are set in carbon-block electrode and touched with metal electrode.

Carbon tips require only occasional dressing and no dipping in acid, with attendant fumes. Carbon electrodes cost 20-40¢ each, last 1-3 months; copper tips cost $0.60 to $1.20 each, last 2-5 days. Moreover, there are no heating elements that need replacing every 6-8 weeks, as with conventional electrically heated soldering irons.

Carbon soldering is applicable to all solders—from bismuth solder at 150°F. to silver solder at 1,600°F. with the same fluxes used with copper tips.

With a little thought and patience, carbon can become "black diamond" of soldering. —AMERICAN MACHINIST

ANODIZED FINISH PROTECTS MAGNESIUM

Anodizing has solved problem of protecting magnesium alloys against corrosion without using so many protective paint coats that much of weight saved by the light metal is lost. Method also provides attractive finish, which can be dyed any shade.

Developed by Consolidated Vultee Aircraft, the treatment produces a magnesium-oxide silicate film. It is carried out in strong alkaline solution at elevated temperature under influence of 4-6 volts, either ac. or dc. Known as Manodyz, process involves cleaning with alkali, rinsing, anodyzing, rinsing, acid cleaning, and neutralizing. —PRODUCT ENGRG.

FLOUR BY AIR BLAST

Germ-free flour resulting from explosion of wheat or other grain with compressed air or other gases is being studied by Midwest Research Institute. The process has been tested in laboratory; next step will be a $100,000 pilot plant. In the process, grain is placed in a metal cylinder. An air compressor puts grain under pressure, air filling tiny pores of grain. After a valve is opened, grain shoots through a small nozzle, releasing pressure suddenly and blasting grain apart.

Mixture of wholewheat bran, wheat germ, bits of endosperm, and flour can be separated, the larger pieces being put through standard milling machines. Since germ, valuable source of vitamin E, is blasted free in one piece, it can be separated from flour, reducing spoilage tendency. —BUSINESS WEEK

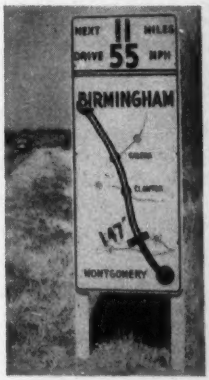
PAVES ACRE A DAY

Concrete paving is laid down at rate of more than an acre a day in the construction of a modern airport in Panama. A train of big equipment, coordinated with labor force, is key to this achievement by U. S. Public Roads Administration. Two pavers are used in tandem or on opposite sides of 20-ft. strips. Behind these is a longitudinal screed with six vertical vibrators on rear to reduce 1¼-in. slump concrete to finishing consistency. This is followed by a finisher, and it in turn by a longitudinal dummy-joint installer. Wood float finishing, followed by careful hand troweling at all joints, completes operation, except for applying curing compound. —CONSTRUCTION METHODS

NEW BRITISH YARN WINDER

Designed to produce an overend supply package at high speed, the new winder of Muschamp Taylor, Ltd., England, winds a package from which yarn will not slough off, even though wound with no tension. Package consists of a bobbin with a short, tubular barrel and conical heads. Package capacity is 2 to 3 lb.; dimensions, 6 x 6 in. Primarily for rayon yarn, the machine will wind any other fibers at a rate of 800 yd. per min.

Yarn is guided by an oscillating thread guide, using the diameter of the built-up package to effect a smooth build against the conical heads of bobbin. Yarn moves in a straight line from supply package, passing through a simple tension device, a slub catcher, and then onto bobbin. Traverse motion is slow, giving almost parallel wind. —TEXTILE WORLD



ROADSIDE ROAD MAPS — Installed along the Birmingham-Montgomery highway, "Minutemaps" quickly give motorist his location, distance to next town, and speed limit. Diagonal line across road marks position. Signs are located on both sides of the road. —ENGRG. NEWS-RECORD

BARK FOR INSULATION DRIED IN INFRARED OVEN

Shredded redwood bark, for insulating material or soil conditioning, is dried by a 216-kw. infrared drier at Sequois Products Co. The oven consists of 12 panels of forty-eight 375-watt reflector-type lamps operating at 440-volts, four lamps in series.

After drying, bark is sent to shredder. Fan blows fibers into a cyclone then into a rotating cylinder. These machines remove dust, dirt, and short fibers. The long, clean fibers, suitable for insulation material, are carried by conveyor to baler. Short fibers, used as soil conditioner, are sacked.

Long wool-like insulating fibers are fire-resistant, vermin proof, lightweight, and without capillary attraction. The material does not settle, and its light weight (4½ lb. per cu. ft.) permits reduction in strength of supporting structures. As a soil conditioner, the byproduct short fibers or fines help soil to retain moisture and protect roots from sudden temperature change. —ELECTRICAL WEST

WATCHES WORKERS BY TELEVISION—Television designed for industrial purposes brings a moving picture of production line operations into the executive offices of Emerson Radio. The company has developed a complete system with cameras and sound pickup which can be spotted at strategic points in a factory. Such remote observation facilitates time and motion studies, quality control, and monitoring of dangerous processing operations. Dialing a selector system at the receiver permits choice of scenes in the plant or broadcasts over the air. It is believed that the system offers advantages for schools and colleges. —ELECTRONICS

HEAT-SENSITIVE MAGNETISM OPERATES CONTROL DEVICES

"Curie Point" metals which have high magnetic permeability when hot, exceptionally low permeability when cold, are the basis of control action in a new gas pilot-light valve developed by Curie Point Alloys Co. When pilot light is out, metal is cold and permanent magnet is attracted to it to hold valve closed.

Alloys are available that operate controls at any selected temperature from 180 to 1,000° F. They can be submerged in liquid or imbedded in nonmagnetic substances such as plastics, lead, and glass and still perform properly. These materials can be applied to apparatus or processes which depend upon presence or absence of heat for operation, or are to be held or protected at one fixed temperature. They can be imbedded in bearings and used in limit switches, electric circuits, and so forth. —POWER

PLASTIC PRESERVES MOLDS

To protect plaster molds of aircraft parts for out-of-door storage, Douglas Aircraft Co. coats them with Plastiform. This rock-like ceramic and thermoplastic product is melted at 240°F. then brushed onto the plaster cast after it has been coated with 10% viscosity lubricating oil or cup grease to prevent sticking. For very large surfaces, such as casts of wing tips, the grease-coated casting is wrapped in burlap before plastic is applied. The plastic covering is easy to remove, and casts can be used with little or no refinishing.

The material is resistant to acids and alkalis, repels water and oils, does not shrink, expand, or warp. —AVIATION

TRACTOR TREADS ON PLANE—Tricycle rectractable landing gear of this Fairchild Packet has been replaced by tank-type tractor treads to test landing on unprepared strips. Track-type gear will lower bearing pressure. —AVIATION NEWS

CARBIDE MILLING BRINGS METAL-REMOVAL REVOLUTION

Carbide milling is considered by many production engineers as, by far, the most important modern machining development and the one most likely to have the greatest effect in increasing worker productivity and reducing manufacturing costs.

No longer, for all practical purposes, do limitations exist in the power which cutting materials can apply. As much as 100 hp. can be applied through an 8-in. face mill, with excellent carbide life. It is, therefore, now possible to disregard cutting-material limitations and to establish operating characteristics on the remaining limiting factors, such as available horsepower and known limits of surface cutting speed and chip, or tooth, loads.

The change in technique is revolutionary, and if full value of carbide milling is to be realized by production departments, the nature of the metal-removal revolution must be appreciated and applied —AMERICAN MACHINIST

TANDEM SHOVELS FOR STRIP

Two (2- and 2½-cu. yd.) shovels working in tandem average 800 to 1,000 tons of coal daily at the Standard Ore & Alloys Corp. mine. Bed ranges from 18 to 42 in. thick, averaging 32 in., and is free of continuous partings. Coal is recovered in widths of 60 to 300 ft. A 10- to 12-ft. overburden of blue slate overlies an 8-ft. hard-shell layer. The former is shot, the latter removed by shovel without shooting.

Two bulldozers, working ahead of shovels, clear timber and make drains. The two shovels work close together, one shovel moving its inside track in the path of the other machine's outside track. Loading shovel closely follows strippers, loading a 42-ft. width, the remaining 18 ft. being used for haulage. At end of pit, strippers double back and on second pass all coal is loaded.

Stripping is done in three shifts, loading in one. Hauling is in 2-cu. yd. trucks. —COAL AGE

RADAR GUIDES SMALL BOATS

To locate an open course for small boats, the new Gould Sonicator will detect obstacles on the surface of the water within 1,000-ft. range and underwater objects within a 2-mile range. High-frequency beams are emitted by a rotating head, and waves echoing from obstacles are picked up. If the dial reads 5 when echo is received, obstacle lies 500 ft. ahead. Lester Gould developed the warning system. —SCIENCE ILLUSTRATED

ELECTRONIC METAL ANALYZER

Rapid and completely automatic analysis of a metal alloy is possible with a new direct-reading spectrometer. Spectrum lines are isolated and their intensity measured with electron multiplier phototubes. Output of each tube charges a capacitor, which at proper time discharges into a meter reading directly in percentage concentration of component being measured. Accuracy is high because no photographic equipment is used and variation in film emulsions is no factor.

Developed by Baird Associates, unit occupies 5 x 12 x 5 ft., but largest component of the analyzer goes through a 30-in. door. —PRODUCT ENGRG.

ELECTRONIC DEVICE GIVES HIGHLY STABLE VOLTAGE

With an electronic regulator developed by Sorensen & Co., voltage stability compares to that of storage batteries. The ac. voltage-regulating circuit (diagram) has a special temperature-limited diode V_1 where filament rather than grid voltage is the controlling element and R_p is a very strong function of filament voltage. With 1,000 volts across the bridge, a change of 0.1 volt in the filament causes unbalances of 8 or 9 volts in the bridge. This voltage feeds into the grid of a beam-power tetrode whose output controls a saturable core reactor which, in combination with an autotransformer, allows control of ac. voltage at a typical accuracy of 0.2% over a 10 to 1 load range with input voltage of 95 to 125 volts. The regulator is independent of line frequency, power factor, or load.

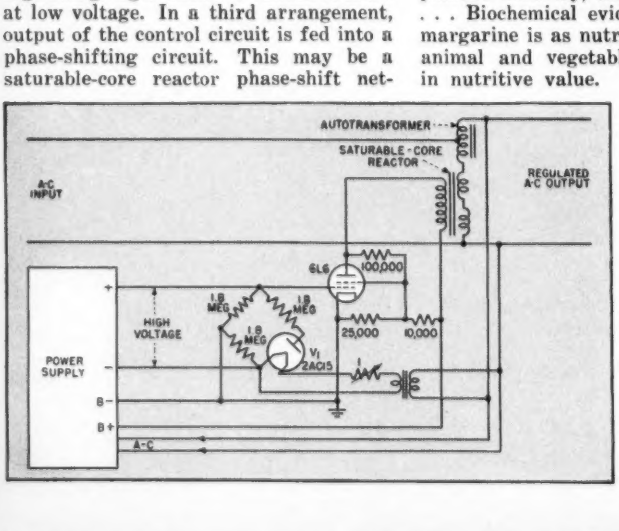
In another adaptation of the basic principles, ac. output feeds into a rectifier and the diode is actuated by the rectifier circuit. This arrangement, called a Nobatron, is especially valuable for regulating high values of direct current at low voltage. In a third arrangement, output of the control circuit is fed into a phase-shifting circuit. This may be a saturable-core reactor phase-shift network which can control the output of a grid-controlled thyratron power supply. This type of application offers extreme versatility since diode may be actuated by ac., dc., or r-f. —ELECTRONICS

FOR PASSENGER COMFORT

To provide increased comfort for train passengers, Minneapolis-Honeywell Co. has developed a new heating system. The exposed heating pipes of coaches and pullman cars are replaced with small pipes in car walls, forming a radiant panel. Pipes carry tetracresylsilicate, a petroleum byproduct. Wire coil-type, michrome-alloy thermostats, unaffected by vibration, are mounted on outside car walls, to register outdoor temperature variations and control heating system accordingly. —BUSINESS WEEK

NEW FOOD TECHNOLOGY

Green olives can be kept from turning brown by heating to 80°C . . . Edible sugar can be obtained from spoiled sirup and molasses by utilizing chemically charged resins to absorb impurities. Organic acids, such as acotinic, valuable in plastics industry, also can be recovered . . . Biochemical evidence indicates that margarine is as nutritious as butter and animal and vegetable fats differ little in nutritive value. —FOOD INDUSTRIES



Basic diode-controlled ac. voltage regulator which compares to storage batteries in stability. Adaptations of circuit control dc. voltage and thyratron power supply. Will operate on frequencies between 50 and 60 cycles.

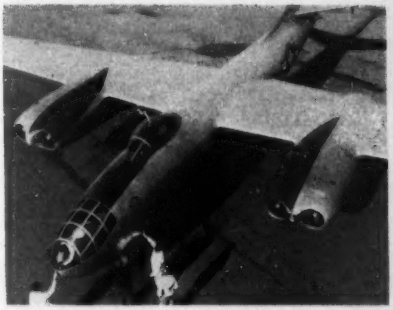
What's New in Aircraft

Britain to build 4-place, butterfly-tail pusher with fuselage constructed in two parts. Wheelair's personal plane is spinproof. New light transport built

Unusual 4-place British personal plane of magnesium-alloy construction is nearing completion. The *Satellite* is a low-wing monoplane with butterfly tail and tail-mounted pusher propeller driven through 7½-ft. shaft by a 252-hp. engine behind seats. Wings are built up of widely spaced ribs and varying thickness skin, with a spanwise member in front of ailerons and flaps. Wing skin thickness is reported to be 2 in. at the root, diminishing toward tips; upper skin is thicker than bottom. Wing is said to be made in components in form of a series of torsion boxes, welded together. Fuel tanks are integral with wing roots. Fuselage is constructed in two sections, joined at wing trailing edge. Magnesium girder in form of keel extends along fuselage bottom and provides firm support for tricycle landing gear. Span is 33 ft. 6 in.; length, 22 ft. 2 in.; empty weight, 1,470 lb.; cruising speed 180 mph.; stalling speed 60 mph.; rate of climb, 1,000 fpm.; takeoff run, 150 yd.

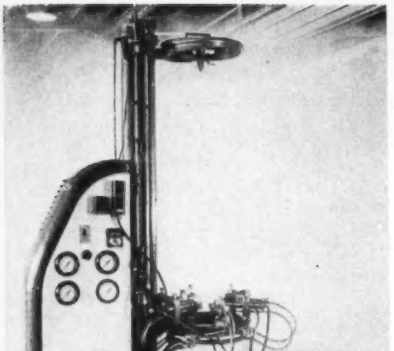
Built and flown near end of war, but not put into production, Kaiser Fleetwings dive torpedo bomber used exhaust gases to cool engine. The gases pumped air through nose entrance and passed it out ducts, obviating cowl flaps and improving streamlining and visibility. Hydraulic and electrical equipment were under cockpit floor, readily accessible through wheel wells and detachable side-panels. —AVIATION

DeHavilland Aircraft Ltd., Toronto, is completing the prototype of its *Beaver*, an all-metal, 6-place, high-wing monoplane, convertible to wheels, skis, or floats. Range will be 500 miles; payload, 1,250 lb. Land version will cruise at 135 mph. and have 18,000-ft. ceiling. A 450-hp. Pratt & Whitney Wasp Junior engine will be used. Seats are removable for added cargo space. Four doors are provided, with additional hatches in rear wall of cabin for long pieces of freight. Wingspan is 48 ft.; seaplane version is 32 ft. long; the landplane, 30 ft. . . . Wheelair's recently flight-tested, twin-tailed, pusher-type 111A is said to be spinproof and stall resistant. All flight and ground maneuvers are made with a throw-over control wheel. Plane has top speed of 140 mph. and 600-mile range. Nylon fuel tanks, in wing stubs, have a 50-gal. capacity.



BUILT FOR SPEED—Four turbojet engines, each with 4,000 lb. thrust at sea level, push XB-45 at speeds high enough to heat cabin by skin friction and require refrigeration. Built by North American Aviation and accepted by the American Air Forces, the medium bomber compares with a wartime "heavy" in size and range, is said to have substantially greater payload. Spanning 89 ft. 6 in., it is 74 ft. ¾ in. long. Engines are arranged in pairs in single nacelles in each wing, are mounted entirely ahead of leading edges for easy maintenance. Four-place cabin is pressurized. —AVIATION

The AAF's new multiple-jet bomber, the XB-46, built by Glenn L. Martin, will have three G.E.-Allison J-35 engines on each wing with separate air intakes. Dual wheels, in tandem, will retract into fuselage; small "outrigger" wheels will retract into each wing. Wing span is 108 ft.; overall length, 85 ft.; gross weight,



VERSATILE FLAME-HARDENER—Adjustable flame head and variable speed of this Steams-Rogers Mfg. Co. flame-hardener permit hardening of cylindrical workpieces by any one of three methods: work stationary with moving flame head; work turning with flame head stationary; and work rotating and flame head moving upward, followed by water quench. Flame head also may be mounted for straight-line horizontal or vertical travel. Cast or rolled steel with 0.35% or more carbon content and grey cast irons can be flame-hardened. —WELDING ENGINEER

105,000 lb.; useful load, 46,500 lb.

Baumann Aircraft Corp.'s *Brigadier 250* light transport has two pusher propellers driven by Continental C-125 engines. Cabin is low enough to permit stepping directly into plane. The 5-passenger craft cruises at 150 mph., and has 18,000-ft. ceiling. —AVIATION NEWS

FIRE-SAFE STAIRWAYS

Ventilating ducts and water curtain sprays around stairways and elevator shafts will prevent hot, toxic gases from spreading to upper floors. Open sprinkler around wellways, activated automatically by heat, cools gases with a heavy water spray. Gases passing water curtain are collected by ducts leading to a flue to the roof. Air intake above the wellway provides downward pressure, preventing wellway from becoming a chimney.

The system is a joint development by Otis Elevator Co., Westinghouse, and Grinnell Co., Inc. —BUSINESS WEEK

AVOIDS PLANE CRASHES

Basically of radar design, a new terrain-clearance and obstacle indicator for airplanes was demonstrated recently by Trans World Airlines and Hughes Aircraft Co. The 16-lb. unit gives pilot warning of obstacles 2,000 ft. to the front or 500 ft. below by bell and light indicators in the cockpit. Warning lights are mounted above center of instrument panel. Transmitter-receiver mounted on underside of fuselage sends out 400 pulses per sec., the receiver picking up echoes from objects within the predetermined ranges.

Hughes officials report that the unit can be installed in transport planes at a cost of $135. TWA planes are being equipped. —AVIATION NEWS

INDUSTRIAL TIMER USES ELECTROLYSIS PRINCIPLE

Time cycles in industrial operations can be duplicated by a new device utilizing the principle that a fixed time is required to produce a fixed amount of hydrogen and oxygen by electrolysis when a fixed current is used. A small inverted glass bell enclosed in a glass tube is surrounded by the solution. Current passes between a cathode and anode inside the bell, and the oxygen and hydrogen generated form a growing bubble in the bell which gradually forces the solution out and eventually leaves the electrodes almost dry. At this point, apparent resistance across the electrodes increases sharply and causes more current to flow through a relay connected in parallel. Operation of the relay passes current through a filament in the bell, igniting the hydrogen-oxygen mixture to convert it to water vapor. As the

vapor condenses, the solution rushes back into the bell to fill the vacuum created. This completes a time cycle, and the process repeats.

Control or counting is effected by a circuit operated by the same relay which closes the filament circuit. Adjustment by rheostat varies the time cycle of this device, which was developed by Geo. E. Fredericks Co. —ELECTRONICS

70 MILES OF PRECAST PILES

To speed construction of huge pier at Norfolk, easily erected forms were devised by McLean Contracting Co. for precasting 5,400 piles (nearly 70 miles of pile). Simple templates were built to align and hold eight or more piles at once for fast driving. Piles are 20 in. sq., 50-80 ft. long, weigh up to 17 tons. Simple pile forms of 14-gage metal on wood frames are positioned without nailing, to insure long form life, which averages 65 uses. Spacer blocks wedge panel bottoms, while notched boards brace tops.

Concrete is mixed in central plant and pumped through 8-in. pipe for buggy distribution. —CONSTRUCTION METHODS

MECHANIZATION FEASIBLE FOR SMALL FOUNDRIES

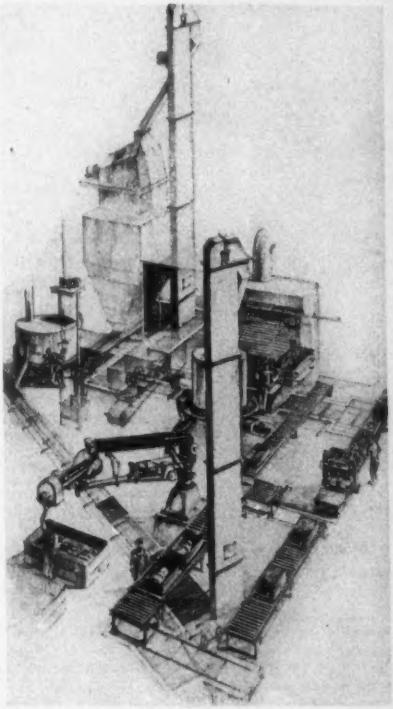
To meet threats of rising costs and labor shortages, small foundries are turning more and more to mechanization, even in shops operating on a job basis with short runs and diversified castings. At Pohlman Foundry Co., the cupola for melting raw material now is automatically charged, giving accurate control. Errors in preparation and placement are eliminated.

Overhead conveyors carry molten metal in individual ladles to mold-filling stations. Using centralized conditioning, a central muddler cleans sand and mixes it with binder. Conveyors move it to molder stations throughout plant.

A feeding device throws sand by centrifugal force into mold frame around pattern and packs it. Excess sand, shaken out of mold patterns, falls through floor grating and is returned to central station by conveyor. Extensive use is made of cranes, jibs, and hoists. Molds are handled on roller conveyors and roller transfer tables. Pushbutton-controlled shakeout devices replace sledgehammers.

Results of Pohlman's mechanization program are: (1) reduction in worker fatigue, (2) improved working conditions, (3) skilled labor can concentrate on specialty jobs rather than on handling of materials, (4) improved control, and (5) quality. —BUSINESS WEEK

Centralized conditioner moves sand to mold-making stations after sand has been cleaned and mixed with binder. Roller conveyors move castings.



NEW PRODUCTS

Plastic Conducts Light—Light from a recessed bulb in the back is carried through a Lucite plastic cone which surrounds the dial face of instruments introduced by Simpson Electric Co. The meters are in 2- and 3-in. sizes. —ELECTRONICS

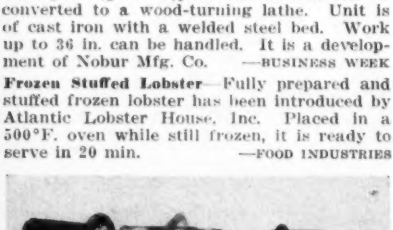
Better Textile Adhesive—For use in making plush, velour, suede, and velvet surfaces, a new synthetic rubber adhesive is said to have longer life and greater flexibility than conventional base coat enamel. This flocking adhesive M-6177 is a U. S. Rubber Co. development. —PRODUCT ENGRG.

Pocket Water Filter—Operating on the same principle as municipal systems, a pocket-sized water filter system insures safe drinking water to persons away from approved water sources. Unit weighs 5 lb., includes a hand pump, filter, and purifying kit. Water filter is a Wallace & Tiernan Co., Inc., development. —ENGRG. NEWS-RECORD

Steerable Tail Wheel—A new steerable tailwheel for lightplanes has been developed by Decker Mfg. Co. Wheel offers positive action at any ground speed. It will not go into full swivel without full rudder and brakes, even when the aircraft is ground looped to 90 deg. —AVIATION NEWS

Converts Drill to Lathe—With the new Drill-Lathe, a bench or floor model drill press having a 2½- or 2¾-in. dia. column can be converted to a wood-turning lathe. Unit is of cast iron with a welded steel bed. Work up to 36 in. can be handled. It is a development of Nobur Mfg. Co. —BUSINESS WEEK

Frozen Stuffed Lobster—Fully prepared and stuffed frozen lobster has been introduced by Atlantic Lobster House, Inc. Placed in a 500°F. oven while still frozen, it is ready to serve in 20 min. —FOOD INDUSTRIES



CORDLESS SOLDERING IRON—For delicate soldering work on meters, instruments, and switches, a pencil-type tool developed by Sound Equipment Corp. of Calif. has no electrical cord attached. It is heated in a receptacle which screws into any size of the company's soldering irons, like a desk pen-set. —ELECTRICAL WORLD

High-temperature Concrete—To provide a castable refractory for high-temperature industrial furnaces, Babcock & Wilcox Co. has developed a concrete which withstands 3,000°F. The Kaocast material is stable and resistant to disintegration under repeated heating and cooling. Volume change on initial firing is small, and there is said to be no expansion or shrinkage with continuous high temperatures. —CHEMICAL ENGRG.

Precision in Production—Variations in cylinder-bore sizes and need for selective fitting of pistons are eliminated through use of Micromatic Hone Co.'s new honing machine. Bores are finished to 0.0005 in. tolerance in 30 sec. Machine is built for six-cylinder blocks, but will handle four or eight cylinders. When bore is of correct diameter, measured by built-in air gage, honing sticks relax and spindles whirl without removing metal. —BUSINESS WEEK

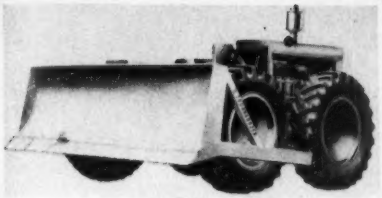
Heater Warms Engine—Not only does it warm the interior of bus or truck, but the new Surface Combustion Corp. heater warms the engine, insuring quick starting in coldest weather. Independent of the engine, the 13x17x28-in. heater uses diesel fuel or gasoline, whichever is used by engine. Automatic or manually operated heater delivers 75,000 Btu. per hr. —BUS TRANSPORTATION

Easy Heavy Handling—Heavy machines and crates are handled by a new electric truck which pulls them by cable onto a roller ramp which tilts to horizontal to become truck platform. It is a Yale & Towne Mfg. Co. innovation. —AMERICAN MACHINIST

Eliminates Mine Posts—Channel-iron seats welded to inverted rail-type rib supports eliminate need for support posts at Kelley's Creek Colliery Co. Seats are fabricated from scrap pieces of 9-in. channel and 40-lb. rail. A 6-in. length of channel large enough to support an 8x8-in. crossbar is welded to base of an inverted rail. Three ft. of rail is inserted in rib role, then cemented.—COAL AGE

Flexible Induction Heater—Portable 10-kva. low-frequency induction heaters which can be stacked on the job to form groups of two or three with capacities of 20 and 30 kva. have been introduced by Electric Arc, Inc. The 30-kva. group will preheat a 10-in. pipe joint, for welding. —ELECTRICAL WORLD

Die-cast Bicycle Frame—An aviation company makes bicycle frames from solid die-cast magnesium. The easy-to-make frames are strong, light. —PRODUCT ENGRG.



BULLDOZER—First machine of its kind in heavy equipment industry, the high-speed, rubber-tired Model C Tournadozer is powered by 160-hp. diesel engine. It is well suited to work requiring much backing and maneuvering, and it can operate over paved areas. In common earth excavation, it can move 184 cu. yd. an hour on a 50-ft. haul. Top forward speed is 12 mph. There are four speeds forward and reverse. Constant-mesh transmission permits selection of any gear ratio with no shifting of gears and no loss of momentum. R. G. LeTourneau, Inc., developed it. —CONSTRUCTION METHODS

Aids Press Feeding—Steel sheets 3 to 10 ft. long are elevated and tilted for fast, easy feeding into a press by the 1- to 5-ton hydraulic table-conveyor introduced by Rack Engineering Co. Table is on casters and is equipped with floor lock. Pedal operates hydraulic lift. —AMERICAN MACHINIST

Flameproofs Cloth—Antoxol, an organic compound developed by Eronel Industries, flame-proofs fabrics but does not alter color, appearance, sheen, or texture. Laboratory tests indicate that tensile strength of fabric is increased. Compound will stand repeated dry-cleaning. —BUSINESS WEEK

Heat-proof Paint—Developed to prevent metals from corroding and scaling at temperatures as high as 1,850°F., Markal Co.'s new heat-proof paint is said to withstand sudden changes, such as quenching, without cracking. Paint follows contraction and expansion of metal at all temperatures. It dries in 20 min. —AVIATION

Silicone Replaces Pan Grease—Bread pans coated with a new silicone glaze need not to be greased by baker. One application is said to last for 200 bakings. Developed by Dow-Corning Corp., glaze is sprayed and baked onto the pans. —FOOD INDUSTRIES

Tough Streetlight Globe—Using Lucite acrylic resin, E. I. du Pont de Nemours & Co. has developed a streetlight globe with better impact resistance than glass globes. Four transparent plastic sheets fit into slotted metal holder. Rocks thrown by vandals do not break globe. —ENGRG. NEWS-RECORD

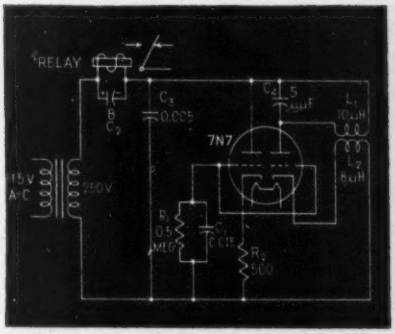
Machine Tool on Wheels—Cincinnati Bickford Tool Co. has mounted standard radial drill on a 110 1/8-in. base equipped with steel wheels. —AMERICAN MACHINIST

Efficient Detergent—Organic solvents and emulsifiers are combined in new detergent, Emlon, to aid formation of stable emulsions in presence of acids, alkalis, and other electrolytes. Developed by Wyandotte Chemical Corp., the detergent is said to be effective and economical in power spray washers, presoak and still tanks, for cleaning prior to phosphatization, and as adjunct to acid, alkali cleaners. —CHEMICAL ENGRG.

Tubeless Pneumatic Tire—Using a sealant of soft, sticky rubber inside a rayon-cord carcass eliminates the innertube in B. F. Goodrich Co.'s new tubeless tire for automobiles. Beaded section is tailored to an air-tight fit against steel rim. Valve is nearer the outside of the rim than in tube-fitted tires. Tire has passed road tests. —BUSINESS WEEK

Work Positioned by Power—To facilitate welding, assembling, grinding, and similar operations, a motor-operated bench-model work positioner has been introduced by Ransome Machinery Co. It handles 100 lb., tilts work to 135 deg. by handwheel, can be revolved 360 deg. by reversible motor. Clutch gives free turning. —AMERICAN MACHINIST

Feed Dryer for Farms—To enable farmers to dry and store perishable feed products such as beets and alfalfa, a farm-size, oil-fired dehydrator has been made by J. B. Beaird Co. Drying is done in a long revolving cylinder through which the heat is drawn by an exhaust blower. —FOOD INDUSTRIES



LOW-COST CONTROLLER—For industrial control applications involving float, feeler gage, or other sensing elements moving as little as 0.002 in., a low-cost, dependable, snap-action electronic instrument has been developed by Brown Instrument Co. Double-triode r-f oscillator changes its plate current suddenly to operate a relay when metal vane moves between induction coils L_1 and L_2. The second parallel tube section has its grid connected to the oscillator grid so that average current thereof also corresponds with vane position; about 60% more current is made available for relay operation by second section. —ELECTRONICS

NEW PRODUCTS

Rubber Journals, Glass Bearings—For turbine pumps, synthetic rubber journals and glass bearings are said to reduce friction and wear on shafts and eliminate use of corrosion-resistant sleeves. Self-lubricating journals are forced over shaft and are sufficiently tight to revolve. Bearing is glass fused to steel tube turned smooth for press fit in spider. Neither oils or commercial acids affect journal or bearing. Farley M. Caldwell developed them. —PRODUCT ENGRG.

Locks Railroad Spike—Of two-part construction—standard railroad spike with a curved hole running from head through body to a point halfway down shank, and a 40-dwt. nail —Morgan Logpike Co.'s new railroad spike is designed to reduce right-of-way maintenance. Spike is driven in usual manner. Then the 40-dwt., nail is driven through head, the curve in shank causing nail to bend and hook into the tie. —BUSINESS WEEK

Electric Pasteurizer—Short-time, high-temperature, all-electric milk pasteurizer in capacities of 1,300 to 10,000 lb. per hr. has been introduced by Ex-Cell-O Corp. Raw milk is preheated by pasteurized milk in regenerator section, then flows through electrical heater. Automatic flow recirculating valve insures the proper pasteurizing temperature. —FOOD INDUSTRIES

Strong Aluminum Solder—Use of auminum may be expanded by a new solder, Alsoco, developed in Switzerland. It provides a fast, effective way to achieve a strong joint between aluminum (or aluminum and copper) parts, while retaining good electrical and physical characteristics. In tests, metal failed before joint. —PRODUCT ENGRG.

Simple Street Marker—Paint contained in a long slender cylinder mounted on two wheels feeds by gravity as Mark-Rite line marker is pushed along pavement. Introduced by Universal Sales Co., the hand-operated marker has self-cleaning valves and is quickly set up. —CONSTRUCTION METHODS

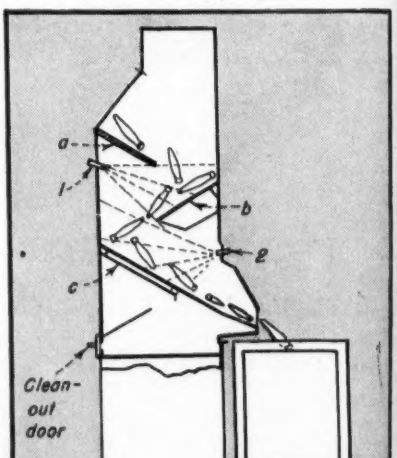
Nickel Scouring Cloth—In cylindrical form, with no loose ends, the new Nickltex scour cloth is knitted of flattened nickel-alloy wire positioned substantially at right angles to plane of cloth for cleaning efficiency. It is said not to unravel, splinter, or leave metallic particles on surface being cleaned. Metal Textile Corp. introduced it. —AVIATION

Tells Duct Temperature—When operating temperature along bus duct exceeds proper level—100° C.—the bulb lights on a new Bulldog Electric Products Co. temperature indicating plug. —ELECTRICAL WHOLESALING

Electric Soil Compactor—Huge vertical cylindrical vibrator—powered by a motor especially designed by General Electric Co. and supported by a crane—compacts the soil by combined action of a water jet and high-speed vibration. —CONSTRUCTION METHODS

Economical Fuses—Renewable "time-delay" cartridge fuses for electrical circuits of 250-600 volts and 1-600 amp. have been announced by Economy Fuse & Mfg. Co. They can be disassembled easily and quickly to insert new links. Knife-blade, ferrule types are made. —ELECTRICAL CONST. & MAINT.

Wipe-on Plastic Finish—Now available for civilian use, a special plastic finish made by Reyam Plastic Products Co. can be applied with cloth to airplane wings, fuselage, propellers, and interiors. —AVIATION



SETS FILLER YARN TWIST—Improved weaving conditions for filler yarn are provided by yarn-conditioner built by Seydel-Woolley & Co. Filler bobbins are dropped through chutes from second floor and are stored in bins behind conditioner. An inclined conveyor moves bobbins from bin to top of conditioner. As bobbins fall from baffle (a) to (b), double nozzle at (1) gives yarn first wetting with conditioning agent. On moving from baffle (b) to (c), nozzle (2) sprays it. Bobbins are aged for 1 hr. in filling box to insure proper setting of twist. Excess conditioning fluid is extracted and cleaning done through clean-out door. Conditioner will handle 200,000 lb. of filling per week at 50% capacity. —TEXTILE WORLD

Heavy-load Rubber Belt—Fabric-rubber belting claimed to be 250 to 400 times as strong as the standard product is made by U. S. Rubber Co. by using Nylon yarn crosswise and Ustex yarn lengthwise. Belting is easy to splice and repair. Longer belt runs will be possible. —BUSINESS WEEK

Paint for Polished Metal—For surfaces of polished steel, iron, aluminum, bronze, and brass—difficult to "wet" with ordinary paints—a new petroleum-derived synthetic "A-Resin" has been developed. It has good adhesion and flexibility, is hard, durable, lightfast, and resistant to many chemicals. It can be used as a primer coat on automobiles. —PRODUCT ENGRG.

Lays Mine Dust—Compound M, new solidified wetting compound for mine dust control, has been announced by Johnson-March Corp. No pumps or motors are required to apply compound, as water pressure proportions it. Proportioner, a 4½-in. dia. 19-in. cylinder, is connected directly to water line. Compound cartridges are 3 in. dia., 8 in. long. The unit is designed for over 100-lb. water pressure. —COAL AGE

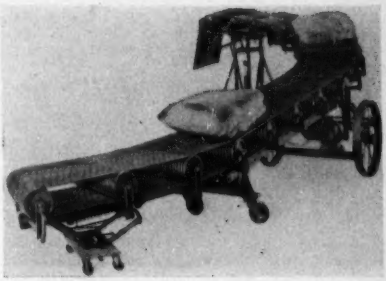
Rotor Shaver Saves Work—Laminations of motor rotors are shaved from the rough in one operation by a new machine using crossed-axes shaving. Developed by National Broach & Machine Co., the shaver is said to eliminate a final operation to reopen laminations closed or smeared by turning and grinding operation. —AMERICAN MACHINIST

Germicide Faucet—For use in sterilizing glassware and dishes, Microb-Master pivoted faucet discharges pure water when swung to one position, a predetermined proportion of chlorine or other chemical-and-water when swung other way. Plastic bell atop faucet controls flow of chemical. Solfred Mfg. Co. makes it. —FOOD INDUSTRIES

Dye-kettle Improved—Ventilating duct is at top and doors slide down in new Riggs & Lombard, Inc., dye kettle. Vapors are drawn up and away from operator when door is opened. Insulated top insures boiling bath. Steam saving is 25 to 30%; dye saving, 5 to 10%. —TEXTILE WORLD

Gives Better Blueprints—Blueprint paper treated with Mirtone WB-2, a silica aquasol derivative, deepens blue and minimizes greying through overexposure. Applicable to any blueprint formula, it can be applied at paper mills or coating plants by conventional machines. It is a Monsanto Chemical Co. development. —BUSINESS WEEK

Decarbonizes Parts—Aluminum alloy pistons can be decarbonized by dipping in Aviation Lex-sol, agitated, then rinsed with warm water. Solvent leaves a rust-preventing film on part. It was developed by Coburn Mfg. Co. —AIR TRANSPORT



FLEXIBLE POWER CONVEYOR—Bags not heavier than 200 lb. are conveyed around curves up to 90 deg. on a 12 deg. max. incline by E. C. Horne Machinery Co.'s new motor-driven reversible, portable conveyor. It will handle 1,500 bags an hour. —FOOD INDUSTRIES

High-vacuum Furnace—For heat-treating materials which are highly reactive to gases, a new 1,800° C., high-vacuum, 5-kw. electric furnace has been introduced by Eitel-McCullough, Inc. It has three chambers, and cycling circuits permit one to be in treatment phase while one is under preliminary pumping, and a third is being reloaded. Vacuum reaches 5×10^{-6} mm. of mercury; capacity is 175 cu. in. —ELECTRICAL WORLD

Air Cargo Guide—Standard route and rate guide for international air freight shippers has been compiled by Air Cargo Publishing Co. A year's subscription, plus additions, costs $45. Guide includes schedule, non-schedule, and charter services; rates for freight or express; rules for packaging; documents and customs; type and cost of pickup service in all cities. —BUSINESS WEEK

Hydraulic-electronic Grinder—Hydraulic and electronic controls provide selective, infinitely variable cycles in new automatic internal grinder of Bryant Chucking Grinder Co. After machine is set up, operator needs only to load and unload work and trip valve to start cycle of rough and finish grading. The high-production machine accurately grinds bores from ¼ to 3 in. dia. up to 4-in. depth. —AMERICAN MACHINIST

FREE SERVICE TO READERS

As a special service to our readers, McGraw-Hill Digest will furnish, without any charge, additional information about any new product or technical development described in this publication. Inquiries are welcomed. Address your letter to: The Editor, the McGraw-Hill Digest, 330 West 42nd St., New York 18, N. Y., U. S. A. —*THE EDITORS*

Scrapers for Mine Efficiency

One unit handles 250 to 400 tons of ore per shift up a 25% grade. Scrapers operating over grizzlies permit multiple blasting of oversized boulders

Use of scraper units for ore transfer or haulage and mucking and loading operations will realize great savings to operators if systems are properly installed. The following illustrations of these combined functions are suggested by consulting engineers in the mining field.

Taking advantage of a scraper's ability to pull up or down grades, a 5-hp. scraper hoist with a 66-in. scraper handles 250 to 400 tons of broken ore per shift. Grade is 25%; scraper travels at a rate of 300 ft. per min. In another operation, a scraper, pulling up grade, discharges into a haulage drift below scram drift, instead of over a ramp. On grades where ore transfer with shaker conveyor, shuttle cars, belts, or motor traction is impossible, the scraper is most efficient.

A two-speed scraper hoist at a raise in a sublevel drift mucks out face and transfers onto the raise, handles supplies up the raise, moves supplies from raise to face, and pulls drill jumbo mounted on skids to the face. Pushbutton control panel gives operator accurate control of speed changes.

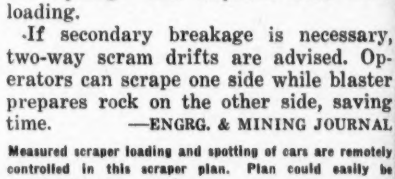
Tonnage per shift can be increased by installing a scraper over a grizzly, the scraper operating from toe of muck pile. Scraper reduces work for grizzly operator, as large boulders can be collected at drum-end of grizzly to be blasted at one time, thus reducing time lost in bulldozing large rock and multiple blasting.

For handling coarse rock, scram drifts are preferable to grizzlies. One operation handles 60 to 80 tons of coarse rock per man-shift by grizzly, while a scraper hoist handles 125 tons and eliminates nine raises and chutes and eight grizzlies. Several 50-hp. scrapers currently are handling over 250 tons of ore per man-shift over distances of 150 to 175 ft.

To overcome sticking of coarsely broken or damp ore in necks of chutes, loading of cars directly from scraper is recommended. One mine is handling 10,000 tons of ore per day entirely by scraper, having eliminated chutes entirely. Chute loading often results in waste—over- or under-loading of cars and spillage—and requires some hand loading.

If secondary breakage is necessary, two-way scram drifts are advised. Operators can scrape one side while blaster prepares rock on the other side, saving time. —ENGRG. & MINING JOURNAL

Measured scraper loading and spotting of cars are remotely controlled in this scraper plan. Plan could easily be extended for 2-way scraping.


REMOTE CONTROL OPERATES HOIST TO SPOT CARS
HOIST FOR SPOTTING CARS AGAINST GRADE
DOUBLE-DRUM HOIST
PULLEY IS MOUNTED UP THE DRIFT TO PERMIT HANDLING LONG TRAIN OF CARS IF DESIRED
EMPTY CARS
LOADED CARS
DOWN GRADE
HAULAGE DRIFT
LOADING PLATFORM
SLUSHER DRIFT
SERIES OF FINGER RAISES FEED DIRECTLY INTO DRIFT
SCRAPER CAPACITY EQUALS ONE CARLOAD
ORE

AUSTRALIAN AIR PROGRESS

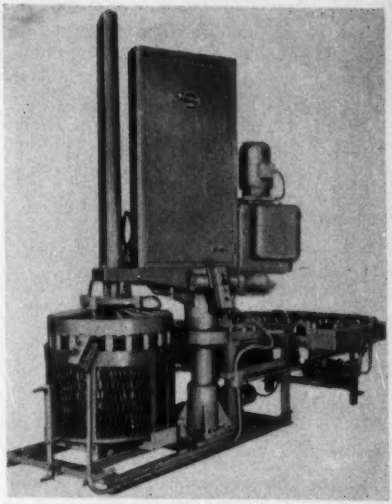
Trans Australia Airways is installing automatic radar distance-meter system on Sydney-Melbourne route. Unit in plane sends out pulses which are returned by ground transponder beacons. Interval shows distance to beacon, and each beacon has identification signal indicating its position. Dial in plane flashes beacon signal every minute. —AVIATION

FABRIC PRINTING PLANT USES LINE PRODUCTION

Flexibility in high-quality screen-printing process has been achieved by Riverside Printers, Inc., through continuous-flow processes. Up to 12,000 yd. of cloth is handled per day. Fabrics received are checked, then stored at one end of the one-floor plant. Bins are fitted with movable shelves, cut to stock-carton size. Closest bin is but 15 ft. from nearest printing table.

Thirteen steam-heated printing tables are 80 ft. long, varying in width from 50 to 72 in. Steam pressure is kept between 10 and 20 psi., maximum temperature of working surface is 98°F. Cloth is pinned to felt table top and printed by hand, operators printing alternate blocks to allow for initial drying. Screens usually are 40 in. wide, 43 in. long. After printing, cloth is hung on wooden rods above table awaiting winding and steaming. Paper separators are used between layers of cloth. Cloth, after drying, is mechanically moved to batching equipment at far end of the room and wound on spools. Steamer capacity is 7,000 yd. of 72-in. cloth. It is steamed 5 to 90 min. under pressure of 1 to 10 psi.

Stripping follows and gum is removed; then cloth is fed into a multiple-tank washer with capacity of 60 yd. per min. After drying, cloth is stretched on tenter frame to proper width.—TEXTILE WORLD



LOADS RETORT BASKETS—Cans or jars are loaded automatically into retort baskets by a new W. F. & John Barnes Co. machine. Containers are received from closing line on storage conveyor and predetermined number are passed to rotating disk. Hydraulically lowered magnet picks up containers, swings 145 deg., lowers containers into basket. —FOOD INDUSTRIES

TELEVISION SIMPLIFIED

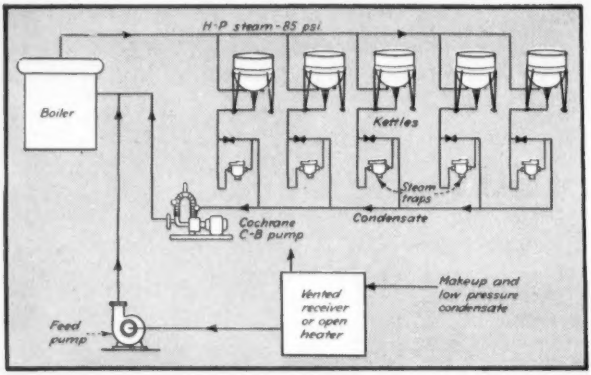
Considered a major step toward reducing the cost of a television system, the new 2-in. iconoscope RCA 5527 is relatively inexpensive and so designed that associated equipment can be compact, simple, and economical. Although the tube uses electrostatic deflection, good definition is obtained by a fine-spot cathode-ray gun with balanced deflection. Resolution is exceptionally good. Since the tube is designed for industrial applications, difficulty from nonuniform background signals, or dark spots, is no factor, and shading signals are not needed. A high-capacitance mosaic results in greater signal output. Quality compares with newspaper halftone. —ELECTRONICS

MORE AIR, MORE IRON

Structural changes in blast furnace design, plus more air under pressure, has increased pig iron production 11 to 20% and reduced coke consumption about 12% in a test furnace at Republic Steel Corp. Air pressure of 30.5 psi. and air volume of 110,000 cfm. are used. About 100,000 cu. ft. of air is required to produce a ton of iron.

Although greater air volume is used, velocity is low, thus fine ore is not lost up the chimney.

Alterations per furnace cost between $70,000 and $500,000, as against $6,000,000 for a new furnace.—BUSINESS WEEK



SPEEDS COOKING — Time for cooking marmalade is reduced 40% at Colonial Preserves by high-pressure condensate-return system for kettles. System also saves fuel, eliminates feed-water waste, and provides more uniform heating. Air and condensate from kettle steam traps enter special centrifugal pump. Air is separated and vented in discharge line, while condensate goes to 85-psi. boiler at 110-112 psi. and 250-300°F. Loop in line keeps pump primed. When there is no condensate, jet pump reduces pressure on return line to remove air.
—FOOD INDUSTRIES

TURBINE PUMPS GAIN WIDE ACCEPTANCE

Their simple construction and favorable performance have brought turbine pumps into wide use in the last ten years. They are suited particularly to handling hot water against moderate pressures, such as boiler-feed and condensate-return service. They do not vaporbind easily and operate satisfactorily under comparatively low suction heads. Capacity varies only moderately with considerable change in discharge heads.

A special centrifugal type, the turbine pump has wedge-shape radial vanes cut into either side of the disk-impeller rim. Liquid being pumped recirculates between the vanes, energy being imparted to it by each vane in a number of impulses during the comparatively long travel from suction to discharge. These impulses are comparable to multistaging in the conventional types of centrifugal pumps.
—POWER

LUBRICATION BY SCHEDULE

Lubrication of 3,000 motors, 1,500 machines, and 45 lift trucks was reduced to a routine at Pittibone Mulliken Corp. through use of detailed lubrication charts, motor files, on-the-job service cards, and special job forms. Data on forms were supplemented by use of decalcomanias at lubrication points of machinery—color indicating type of lubricant, shape denoting frequency of lubrication.

The system permitted use of inexperienced labor without sacrifice of efficiency.

Lubrication charts were formed from data supplied by machinery manufacturers' service manuals. After study of charts, lubricants on hand were reduced 50%.
—FACTORY

FOOD TRAILERS AT 0°F.

Precooled loads of perishables can be kept at any temperature between 0 and 70° F. (±2°F.) in 20-ton refrigerated trailers operated between California and Chicago by Pacific Intermountain Express. Cold air is blown over top of load from front to rear, down through the load to the bottom, and back to trailer nose along floor, carrying away heat which leaks through insulation before it contacts the load. Weighing 1,373 lb., the refrigerating system consists of a compressor and condenser under trailer floor and cooling coils and blower inside trailer nose. Electric blowers circulate 4,400 cu. ft. of air per min. Air-cooled gasoline engine drives the under-floor refrigerant compressor.
—FOOD INDUSTRIES

Latest in Electrical Wiring

Progressive electrical engineering and construction techniques utilized in big research center. Modern lighting systems used

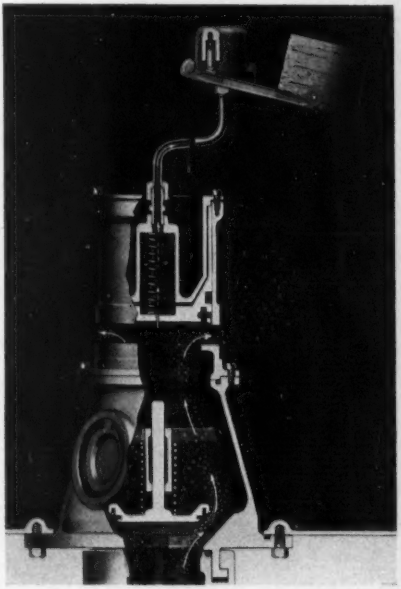
New construction methods, new installation techniques, and new conceptions of electrical service for the laboratory field are found in the new 93-acre Johns-Manville Research Center.

An underground cellular power distribution system, utilizing over 8,000 ft. of Transite duct, carries primary current at 4,160 volts to local transformation areas in each building. Movable laboratory partitions consists of asbestos-cement panels that are "buttoned" to vertical steel studs on 2-ft. centers. Utility services, installed beneath the asphaltic tile and concrete flooring, have junction boxes and taps at 11-ft. intervals. By locating partitions over the taps, and connecting subfloor utilities to partition-encased conduit, laboratory widths can be varied by multiples of 11 ft. to meet operational requirements. Partition panels quickly can be removed from studs to facilitate access to utilities.

Adjustment of space in the factory areas also is possible. Rear walls are constructed with removable asbestos-cement sheets to permit addition of temporary housing for extra-length equipment or permanent expansion.

In the Wet Semi-Works building, the power distribution system is 440 volts, 3 phase, 3 wire for all motors of ½ hp. and larger. Three 333-kva. transformers (4,160/480 volt delta-delta) feed the main power switchboard. Nine power panels supply current to fans, compressors, elevators, condensers, pumps, and floor junction boxes. Also connected to the power switchboard through six 700 MCM cables is a 1,000-amp., 3 phase, plug-in busduct running the length of the factory area at 20-ft. height. Plug-in openings are located every foot on alternate sides. Motors in the ten separate factory areas are connected to this busduct. Motor capacities range from fractional to 100 hp., total load in the area connected to the busduct exceeding 2,000 hp. An additional 270 hp. is connected directly to power panels.

Lighting system is 120/208 volts ac. with 4-wire mains and 2-wire branches



UNDERWING REFUELING—Operating at rate of 200 gal. per min., this Parker Appliance Co. underwing refueling valve provides a closed system with a valve in two sections—a permanent tank compartment and a hose-nozzle compartment. Nozzle must be locked firmly into tank unit before flow is possible, and it cannot be withdrawn until valves are closed. Remote control float valve closes main valve when safe fuel-tank level is reached by pressure of incoming fuel. Preset meter shut-offs supervise exact duration of flow. —AVIATION NEWS

having grounded neutrals. Three 75-kva. units (440/120/208 volts deta-wye) are connected from the power switchboard by 3-phase, 3-wire, 400-amp. bus and to the lighting switchboard by 3-phase, 4-wire, 800-amp. bus. Six air-cooled 37.5-kva. lighting transformers (440/120/240 volts) are connected to the plug-in busduct in the high-bay factory area and are mounted 16 ft. above floor level.

Narrow column type lighting panels are mounted between column flanges directly beneath each dry transformer. As in the case of power distribution, the smallest branch lighting circuit consists of 12-gage wire. All lighting circuits over 100 ft. in length are 10 gage.

Lighting in the factory area is by 1,000-watt incandescent high-bay units 25 ft. high, 15 ft. on centers. Crystal glass prismatic reflectors direct light downward, and loss of high-angle light is minimized by controlled redirection. Because of height and shielding angle of 30 deg., glare is negligible. Intensity of 30 fc. is achieved with 3.85 watts per sq. ft.

Fluorescent lamps light the laboratories. These are flush troffers 20 ft. long, 12 in. wide, 5½ ft. on centers. Two rows of 40-watt white lamps, 10 in all, are installed in each run. Controlling lenses are of prismatic glass. Intensity of 40 fc. is provided by 3.5 watts per sq. ft. Fluorescent corridor illumination is 15 fc. —ELECTRICAL CONST. & MAINT.

SUBSTITUTE FOR SALT

A new salt substitute, Neocurtasal, has salt flavor and texture, flows freely, and is used in the same manner as sodium chloride. The odorless, white, crystalline substance consists of potassium chloride, ammonium chloride, potassium formate, clacium formate, magnesium citrate, and starch. It was developed by Winthrop Chemical Co., Inc., for persons whose body tissues store abnormal amounts of water. —BUSINESS WEEK

DOING THE UNUSUAL BY ELECTRONIC METHODS

Electronics can accomplish quite a variety of results. Some recently developed electronic and related techniques follow:

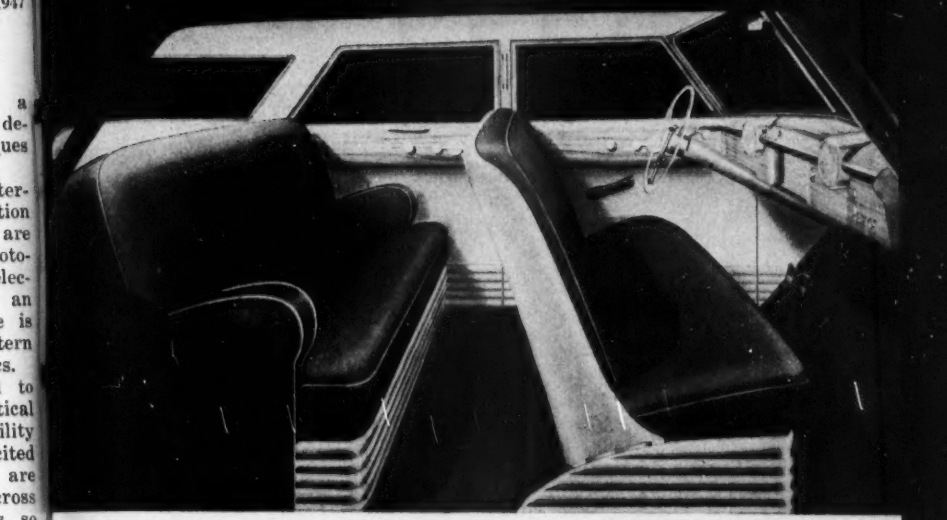
Diameters of distant stars are determined by the sharpness of diffraction bands produced when the stars are eclipsed by the moon. A 1P21 phototube convert the bands of light to electric current which is depicted on an oscilloscope. The oscilloscope trace is recorded on a moving film, the pattern showing the diffraction characteristics.

Saturable-core reactors are used to measure magnetic fields. Two identical coils, on thin strips of high-permeability alloy, are connected in series and excited by an oscillator. Secondary coils are connected in series opposition and across a voltmeter, the two transformers so formed being placed a short distance apart. A difference in the magnetic field produces a voltage indication. Gradients of one thousandth gauss per meter in earth's magnetic field can be detected.

Nutritional value of foods is determined by an electronic fluorimeter. Light given off by vitamins is measured with the aid of an electronic amplifier employing a modified Wheatstone bridge.

Movements of insects in soil can be followed by attaching a small amount of radium sulphate to them and detecting radioactivity with a Geiger-Muller tube.

Mirrors for television projectors are dried in vacuum chambers, by bombardment with electrons emitted from incandescent tungsten filaments and attracted to the mirrors by high positive voltages. The electrons heat only the surface, evaporating the residue of moisture left after grinding and polishing. The mirrors are then coated, while still in the chamber, by evaporating aluminum onto them. Electron bombardment does not leave mirrors warm, as do other drying methods. —ELECTRONICS



All-plastic interior for tomorrow's automobile. It includes plastic head lining, door panels, window garnish, moldings, instrument panel, seat coverings, and floor mat—as well as plastic steering wheel, door knobs, and escutcheons. Any fabric, wood, or leather pattern can be incorporated in laminated plastic panels.

PROGRESS IN PLASTICS

—Report to Management—

No class of industrial materials has made more recent progress nor holds more promise than plastics. New materials, applications, and techniques offer important opportunities for product improvement. To bring these to the attention of manufacturers of the world, a special progress report on plastics is presented here. It is digested from Product Engineering.

NEWEST industrial resin made available in 1946 was a polymer of tetrafluoroethylene, named Teflon by du Pont. It was used during the war in gaskets, seals, and valve seats where extremely corrosive conditions were encountered. Teflon does not undergo a solid-phase transition until the temperature reaches 608 to 621°F. Its coefficient of thermal expansion increases sharply at such temperatures, however, and is twice that of aluminum even at room temperature. The plastic has been utilized in gaskets and wire insulation at temperatures up to 575°F. Equally good at low temperatures, Teflon, in film form, flexes without cracking at -150°F.

Because of extreme inertness, no cement has been found which will attack its surface sufficiently to make a good bond, a property which can be used to advantage where a nonsticky surface is essential. Suggested uses include: mandrels on which small coil forms can be wound and cemented; certain molds.

Water absorption of molded Teflon is very low — being

rated zero by a standard test. Its electrical properties give it many potential applications in the power field.

Both the dielectric constant of 2.0 and the power factor of 0.02% are substantially constant over the full range of frequencies from 60 cycles to 3,000 megacycles. It does not carbonize and arc-over. Tensile strength is 2,500 to 4,000 psi.

Tough, Flexible Polyethylene

Similar to polystyrene in chemical resistance, polyethylene is an opaque, semi-rigid thermoplastic. It was developed by Bakelite and du Pont during the war as a tough, flexible, low-loss insulation for coaxial cable used in high-frequency applications. In thin sections, it is extremely flexible, but not rubbery or elastic.

The water and low-temperature resistance are excellent. The plastic resists most acids, including hydrofluoric. Electrical properties practically are unaltered by water. Low heat distortion point and low melting point (105°C.) permit easy molding, but limit uses of the material.

Polyethylene shows promise for moisture-proof packaging, shower curtains, and similar applications. With added lubricants, it has found a large field in wire coating. Extruded sheeting, tubing, and belting are available in a variety of translucent and opaque colors.

Useful New Styrenes

Polystyrene has become available in much larger quantities, and copolymers of styrene have been produced. Monsanto's Cerex X-214 has a heat distortion point of 230°F., can be immersed in boiling water indefinitely. General Electric's Textolite 1422 is of interest as a high-frequency electrical insulator. It can be cast, is machinable to close tolerances, and has many applications where compression or injection-molded plastics are not suitable. Dow's Styraloy is flexible and shock resistant from -90 to +212°F., is lightweight, has negligible water absorption. Applications include handles for tools, household appliances, gaskets, bushings, coil forms, scuff plates, and belting.

Plexene M, made by Rohm & Haas, does not show the marked tendency to crazing characteristic of many molded styrene compounds. It is practically unaffected by acids, alkalis, and dilute alcohol. It is resistant to gasoline, and commercial inks, but is attacked by organic solvents such as acetone and ethylene dichloride. Polydichlorostyrene of a new type has been developed by Mathieson Alkali Works. Known as DCS, it is supplied as a molding powder. It withstands boiling water

Applications of polytetrafluoroethylene include flared tubing, threaded pipe, cylinders, coaxial cable spacers, gaskets, tape, plug cock, valve-stem packing and rod.

indefinitely, is easily molded, odorless, resistant to strong acids and alkalis, has practically constant dielectric and power factors over range of 100 cycles to 3,000 megacycles.

Mixtures of polystyrene and glass were developed during the war to make a new series of Polyglas plastics, with extremely high dielectric constants.

Internal stresses caused by molding are relieved in polystyrene parts by annealing in a water bath, the temperature reaching 150°F. at the end of the process developed by the Plax Corp.

Rubber-Like Vinyls

Known as rubber-like plastics, the vinyls came out of research for rubber substitutes. Most common is polyvinyl chloride. It also is produced as a copolymer with polyvinyl acetate, which is available as a separate polymer. Other common vinyls include polyvinyl butyral and vinylidene chloride.

Polyvinyl chloride sometimes is copolymerized with vinylidene chloride.

Vinyl polymers and copolymers are well established in the electrical field, especially as wire and cable coverings. Other extruded vinyl products include tubing for corrosive chemicals, beverage tubing, gasket and packing material, garden hose, and automotive-body and refrigerator strips. In different formulations, the vinyls are being injection-molded into such products as grommets for aircraft and motor vehicles, storage jars and cases, battery fuses, switch-boxes, light plugs, and ladles and buckets for chemical service.

Without added plasticizers or lubricants, vinyls can be produced as rigid transparent sheets. These make attractive, corrosion-resistant boxes for industrial and consumer products. An "elastomeric" formulation can be injection molded to form rubber-like products. A brush holder for a vacuum cleaner is made in this way. Vinyl plastics can be compression molded to any degree of hardness.

Colorless transparent acrylic resins can be transformed into flashing pieces that rival gems and crystal in sparkling beauty, and surpass them in adaptability. Molded or cut for maximum interior reflection, the plastics offer a scarcely touched medium for commercial design and decoration.

Important New Cellulosics

Newcomer in cellulosics, cellulose propionate, continues to be investigated. Introduced by Celanese Plastics Corp., it has high surface luster, shorter injection molding cycles, complete freedom from odor, and the ability to follow cellulose acetate butyrate in the injection machine. Dimensional stability and toughness are said to be superior. An important application is in injection-molded housings for vacuum cleaners.

Facil Fabric, another new Celanese development, consists of lengthwise laminations of rayon material imbedded in cellulose acetate film. It is reported to be an extremely high-strength electrical insulating material, especially suitable as wire covering.

Range of applications for cellulose acetate has been broadened by development of a "high acetyl" acetate. It has higher

water resistance, improved dimensional stability.

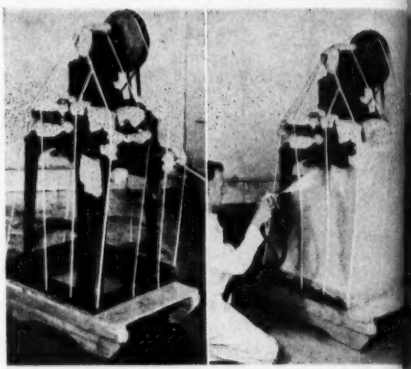
Applications for ethyl cellulose have greatly increased. Use of the tough plastic in the Proximity Fuze was indication of its properties, such as dimensional permanence in all climates, high shock strength, excellent electrical characteristics, rapid moldability to close tolerances.

Low-Pressure Plastics Gain

Large-volume use of the comparatively new low-pressure resins began last year. Two general types of resins are employed: (1) polyesters, including alkyds, alkyd-styrenes, and allyls; (2) phenolics.

Low-pressure laminating requires but ¼ to 15 psi., compared to 1,000 to 8,000 psi. for high-pressure work, reducing the amount of expensive equipment required. Parts can be made on cheap molds and cured in ordinary ovens and heating tunnels, and they can be of a size and shape practically impossible to duplicate economically by other methods. The materials have high dimensional stability, are hard, can be finished as transparent plastic or in attractive colors. Applications include cast lenses and prisms, special dial and indicator crystals, light shields, and lamp and illuminated-sign parts. Such resins are marketed by B. F. Goodrich Chemical Co. (Kriston), du Pont Co. (BCM), and U. S. Rubber Co. (Vibron).

Strong, lightweight sink is made of glass fiber warp mat bonded with low-pressure laminating resin. Colors can be incorporated directly into resin.

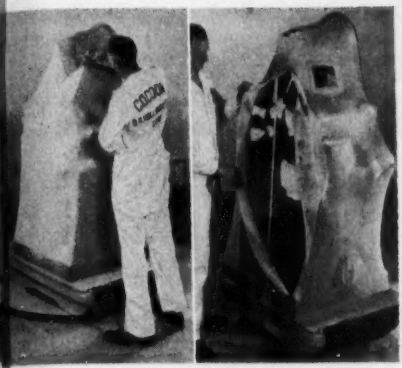


Plastic "cobweb" is sprayed over tape framework and covered with moisture-proof plastic top coat to protect

Low-pressure laminating has come a long way. Industrial parts ranging from cargo compartments for air transports to deep-freeze cabinets are being made. Materials used in combination with the resins include glass cloth, cotton, paper, rayon, and asbestos. Unusually high strength makes the glass cloth laminate of great importance to industry. Physical properties—including energy absorption; tensile, compressive, flexural, and impact strength; and modulus of elasticity—greatly exceed those of structural steel. Typical applications are automobile body parts, fenders for trailers, trunk lids, covers for hardwood forming dies, and label holders on packaging machinery.

A new technique of low-pressure laminating with glass mats has been developed. Mats are cut to preform size, shaped between male and female halves of the mold, and trimmed. The mats may be impregnated previously, or the resin may be added in the mold.

In manufacturing interior paneling for the DeSoto station wagon, pressure of about 500 psi. is used. High-strength paper impregnated with special phenolics is cut to shape and positioned in a core of heavy alpha cellulose paper. The "sandwich" then is placed in a laminat-



machine during storage or shipping. A desiccator is placed inside, and a moisture indicator installed.

ing press and cured 1½ min. at 350°F., after which the laminate is held flat in a wooden die until cooled. The panels then are heated by infrared lamps to 300°F. for subsequent die cutting and stamping operations. Some parts are "postformed" in simple wooden dies.

Strong, Moldable Pulp-Plastic

Paper pulp combined with thermosetting resins—a development of Keyes Fibre Co.—is molded into large, strong objects which can have thin sections and undercuts. Pulp-resin preforms made to conform very closely to the dimensions of the finished article eliminate inherent deficiencies in ordinary thermosetting molding compounds. The final product is of a dense, hard, uniform material of continuous felted and interlocked reinforcing structure bound together by a synthetic resin. Typical applications include machine housings, switch and junction boxes, loop antennas for radios, fronts for refrigerator drawers, and serving trays.

Promising New Laminates

A development which promises to have many industrial applications is the new thermoplastic cellulosic laminates. These are made of fabric or paper base materials bound with cellulose acetate or ethyl cellulose. They are fabricated easily by heat forming and deep drawing from flat sheets. These differ from most other laminates in that the binding resin is tough and need not depend entirely on reinforcing for impact strength.

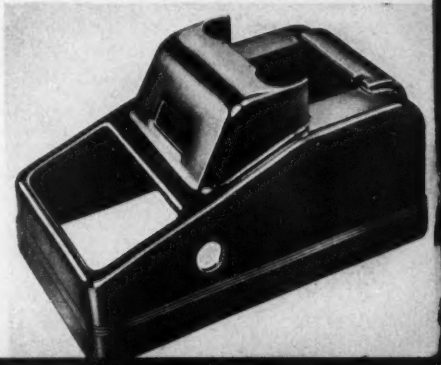
To apply the resin, Hercules Powder Co. has developed a special fabric-coating machine which feeds molding powder onto a metal belt. The powder is softened in an infrared oven and applied to the cloth on a squeeze roll in a continuous process. Printed textiles can be laminated to produce many unusual decorative effects. Applications include lightweight scuff-proof luggage and automobile door panels and kick plates.

Unique Protective Coatings

More of the synthetic resin output is used by the surface coatings industry than by any other group. Practically every type of plastic is used at one time or another for this purpose, but notable advances have been made.

Developed by the U. S. Navy, "spray packaging" can be used protectively to enclose equipment of all types and sizes for storage or shipment to humid climates. A framework of pressure-sensitive tape is built around the object to be sealed. Then: (1) a vinyl-base solution

Molded of a mixture of paper pulp and thermosetting resin, adding machine housing has good finish, high impact strength, excellent dimensional stability.



Acrylic television-receiver lenses are semi-positive compression molded. Injection proved unsatisfactory.

is sprayed on to form a cobweb-like film over the framework. (2) A "moisture-barrier" coating is sprayed on, this being a solution of vinyl resins from which the webbing agent is omitted. (3) A pigmented vinyl base top coat is applied if long-term outdoor storage is to be encountered. (4) Before coating is completed, a desiccant is placed inside the "wrapper" and a moisture indicator installed behind a transparent window. Vinyl coatings also are applied to machine parts and tools by dipping. These peel off easily when cut.

Other new vinyl developments include a tape for masking during electroplating and shrink-fit caps and tubing for metal parts. Strippable and other types of protective coatings are produced from copolymers of vinylidene chloride, tradenamed "Saran" by Dow Chemical Co.

A cellulose acetate butyrate gel lacquer for dip coating has been developed by Tennessee Eastman Corp. First application was on cast aluminum airplane control wheels.

Nylon for Machine Parts

Originally known as synthetic fibers, the polyamides, or nylons, were developed as molding materials during the war. Two principal formulations are available: FM-1, melting at about 505°F., and FM-3, about 450°F. Nylon molding powders have a sharp melting point and become extremely fluid, so molding temperature must be closely controlled.

Molded nylon products have unusual bearing strength, heat resistance, toughness, and chemical and water resistance. Nylon rods recently introduced by Polymer Corp. can be machined to make such products as valve seats, washers, insulating bushings, small gears, bearings, and pulleys. Other new developments are leather-like flexible nylon sheets and thin films or foils of nylon. These can be used as substitutes for leather, for packaging, and for wire covering.

The Versatile Silicones

Perhaps no single group of materials has appeared in so many new and different forms as the silicones. These materials, with a silicone atom incorporated in the organic polymer, are notable for high heat resistance, inertness, and excellent dielectric properties.

Silicone electrical insulating varnish introduced by Dow-Corning as DC990 cures at ordinary baking temperatures yet withstands 350°F. and high-moisture conditions. Used to impregnate and bond glass fibers, asbestos, and mica, silicone varnish produces insulation for coils, motor stators, air-cooled transformers and other electrical machinery. A special silicone grease does not harden at −40°F. nor melt at 500°F. Silicone rubbers are proving useful as gaskets and seals for extremely high- and low-temperature applications or where corrosive liquids are encountered.

A new thermosetting silicone resin, DC 2103, is designed for use as a heat-stable bonding material for inorganic fabrics to produce rigid electric laminates. It also bonds powdered metal, mica, silica, or carbon to form friction-producing materials. Glass silicone laminates are especially suitable where high strength, temperature resistance, or dielectric strength is desired. Laminating pressures are about 1,000 psi. at 175°F.

New Production Techniques

Modern answer to the problem of molding phenolics at a profit, auxiliary plunger transfer molding speeds production. It is used in conjunction with radio frequency or steam preheating. The transfer chamber is a sleeve, the movable bottom of which opens directly into the runners. This makes a sprue unnecessary and shortens the flow path to the cavities. The movable bottom of the transfer chamber pulls away when the mold is open. The transfer piston is actuated by an auxiliary cylinder independent of the main press ram, which clamps the mold halves shut previous to molding. Production of small parts in large volume is well suited to this method.

A noteworthy advance in techinques of thermoplastic extrusion is the production of cellulose acetate and acetate-butyrate sheeting 24 in. wide. This is done by a nonsolvent continuous process using a standard extruder.

Acrylic lenses for projection-type television receivers are being compression molded by Radio Corp. of America. It has been found that metal, not glass, molds are necessary in molding true optical lenses.

Phenolic materials now are extruded, the flow and cure being concurrent. One extruder has a screw with intermeshing baffle gears, while another utilizes a reciprocating piston. The latter is the better suited to small parts. Best results have been obtained with a phenolic, semi-compact, macerated, paper-filled material. Indications are that thermosetting extrusions can replace laminated tubes and rods in specialized applications, and provide better dielectric properties, water resistance, finish, and dimensional tolerances.

By means of vacuum evaporation, metal coating is being applied to industrial as well as ornamental products. Metal coatings also can be applied by adhesives, spraying, and electroplating.

There is a trend in the building of injection-molding machines for large plastic and rubber parts. This enables the designer to take advantage of the superior properties of thermoplastics for such objects as automobile dash panels, radio cabinets, and telephone handsets and bases.

Light Sandwich Structures

Structural plastic panels of particularly high strength-weight ratio are made by bonding foamed plastic, balsa wood, or a honeycomb of impregnated cloth, paper, or glass cloth between sheets of aluminum, stainless steel, wood veneer, or plastic sheets. Standard cotton cloth honeycomb weighs 3¾ lb. per cu. ft., that made of paper, 1 to 3½ lb.

These panels can be manufactured with the dimensional stability of metals, and they can be produced with compound curves. Fabrication and assembly are economical. The materials are being adopted widely in industry and transportation for hundreds of uses. Honeycomb sandwich flooring in the new Martin 202

Trend is to injection molding of comparatively large plastic parts. Side section for refrigerator is 31½ in. long with 120 sq. in. area; is made of polystyrene on a 16-oz. press built by Hydraulic Press Mfg. Co.

Honeycomb - sandwich structural material with high strength - weight ratio is used in floor of new Martin 202 transport plane. Rigid face sheets are bonded to honeycomb of plastic - impregnated paper, cloth, or glass cloth.

twin-engine transport plane takes primary loads as part of fuselage structure, saving 35% in weight and increasing strength 30%. Other applications are in trailer and railroad car panels, door panels, shelving, table tops, work surfaces, and air ducts. It was developed by U. S. Plywood Corp. and Glenn L. Martin Co.

Sandwich structure with a core of balsa wood and aluminum-alloy faces has been introduced by Chance Vought Aircraft Div. of United Aircraft Corp. It has proved successful in the airframe of two types of experimental naval aircraft and in the stabilizers of the F4U Corsair fighter.

Sandwich structures with foamed plastic cores are finding wide use in the refrigerator industry.

Plastic-Rubber Materials

Mixtures of phenolic or vinyl resins and synthetic rubbers are used to impart greater toughness to molded products or to speed the cure and improve chemical and heat resistance of rubber stocks. Three blends have been developed by B. F. Goodrich Chemical Co. Polyvinyl chloride with butadiene-acrylonitrile synthetic rubber (Buna N or "nitrile") has increased flex life, sunlight and ozone resistance, reduced flammability, less creeping in lightly loaded stocks, better abrasion resistance.

Synthetic rubber imparts to a vinyl compound the ability to pull from a hot mold without tearing. It therefore is economically feasible to compression mold thermoplastic products from polyvinyls by eliminating the cooling of molds.

A three-way combination of butadiene-acrylonitrile-rubber, polyvinyl chloride, and phenolic resins is promising. Various blends range from a soft elastomeric to a hard, tough compound. Hard rubber-like products can be prepared without high sulphur content and consequent defects. Impact resistance of these materials is outstanding. They are lightweight and reproduce mold surfaces so faithfully that no finishing is necessary. Phenolic resins alone added to Buna N synthetic rubber result in sulphur-free products of excellent abrasion resistance. Nitrile synthetic rubber, when blended with vinyl chloride, vinyl acetate, and copolymers, acts like a plasticizer and improves physical properties.

Synthetic rubber-plastic combinations are used by U. S. Rubber Co. to impregnate glass and asbestos fabrics for special purposes. Products made from the fabrics include ducts for heating and ventilating, and for carrying flour, sugar, and chemicals in manufacturing plants. Adhesives of outstanding quality also are made of synthetic rubber-plastic compounds.

Thermoplastic rubber-plastic copolymers have been "tailor-made" for use as chemical- and scrub-resistant paints and paper coatings. Pliolite S-5 and S-7 for paints and paper coating, respectively, have been developed by Goodyear Tire & Rubber Co.

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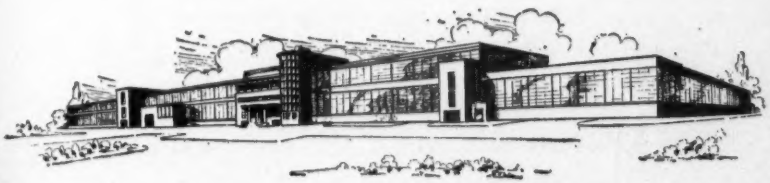

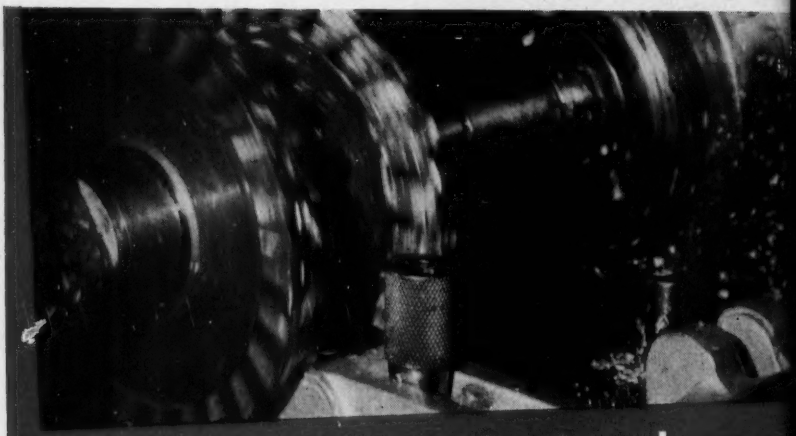

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